THE

CHICAGO JOURNAL

—OF—

NERVOUS AND MENTAL DISEASE.

EDITED BY

J. S. JEWELL, M. D.

Professor of Nervous and Mental Diseases in Chicago Medical College.

ASSISTED BY

H. M. BANNISTER, M. D.

VOL. II., 1875.

AMS PRESS, INC.

NEW YORK

Reprinted with permission of
The Jelliffe Trust

Abrahams Magazine Service, Inc.
A division of
AMS Press, Inc.
New York, N.Y. 10003
1968

Manufactured in the U. S. A.

THE

CHICAGO JOURNAL

OF

Nervous and Mental Disease.

Vol. II. JANUARY, 1875. No. 1.

Original Articles, Selections and Translations.

*Art. I.—PATHOLOGY OF EPILEPSY.

Difficulty of the subject—Two leading phenomena to be explained, viz.: loss of consciousness and convulsive action—Loss of consciousness due to sudden anemia—How it is produced—Reflex vaso-motor action—Conditions on which the convulsive action in epilepsy depends: 1st, Loss of inhibitory power of brain; 2d, Derangement of circulation in the medulla oblongata; and 3d, Morbid nervous impulse from some distant part of the nervous system—Source of such impulses—Spinal cord and cerebro-spinal nerves—Brain—"Discharging lesions" of brain—Cause of the discharge—Proofs of correctness of the views given—Proofs from the domains of therapeutics—Experimental physiology—Pathological anatomy, &c.

GENTLEMEN: In this lecture it will be my endeavor to place before you a statement of what I have come to regard as probably the true Pathology of Epilepsy. I need not tell you that it is one of the most important diseases the physician can meet with, and on many accounts, not only is it most interesting as a study, but also on account of its frequency, and the deplorable and even hideous results, both bodily and mental, to which it leads in those who suffer from it, and finally, because it may be transmitted hereditarily, as happily but few diseases are or can be.

*A Lecture delivered in the Chicago Medical College.

Perhaps more has been written on the subject of epilepsy, than any other single form of nervous disorder; and yet it is far from being understood. The various symptoms, forms, complications, and terminations of the disease, have been noted and described with almost wearisome minuteness. Almost everything has been tried, either with reason or without it, for its relief, and with only moderate success. But all this while some real progress has been made toward an understanding of the true nature of the malady. It is my purpose to-day, to try and explain as clearly as I can, the nature and order of the morbid phenomena, that make up a typical attack of epilepsy. In doing this, I cannot refer at length to the opinions of others. I will only try to state what seems to me probable as to the pathology of the disease. And permit me to say to you, that the first thing for you to do, or to try to do in regard to any disease, is to obtain as clear a notion as you can of its pathology, as a basis for rational or truly scientific procedure, whether you look to diagnosis, prevention or cure.

It is not my present purpose to describe in detail, the symptoms of epilepsy. I will only mention two of the characteristic phenomena or classes of phenomena, as the subject for discourse.

They are, *first*, the loss of consciousness, and *second*, the convulsive disorder. Of course there are other phenomena, such as the epileptic aura, the cry, the embarrassment of breathing, the sweat, the stupor which comes on or continues after the convulsions cease, accompanied by heavy slow breathing, &c., which demand attention. But I propose to limit myself chiefly to the two points mentioned.

1. The sudden loss of consciousness is one of the prime characteristics of epilepsy. As a rule it is not only sudden but complete This condition may only exist for a few moments, as I have often seen, or for a much longer time. But whether long or short, it must always exist in true typical epilepsy. There may be no visible evidence of convulsion, as is true of some cases of the slighter form, or the *petit mal*, but the loss of self-consciousness must as a rule be present.

But the degree and the duration of this loss of consciousness, is fully described in various works accessible to you.

What I am to try to do, is not so much to describe as to *explain* it. Then how is it brought about? It cannot be as a rule, on account of any substance in the blood, or any appreciable physical injury to brain structure. It comes on and disappears frequently, too suddenly for any such modes of causation. A person of fair intellectual capacities, and quick perceptions and feelings, in the midst of some mental occupation, it may be, is almost in an instant, and in some cases without, or almost without warning, smitten into unconsciousness, and falls as helpless and senseless, as if a bullet had passed through the brain, and in a period varying from a few minutes to hours, may regain his faculties, and be about again, to all appearance much as before. Now, what is the matter with the brain in such a case?

So far as we know, it is due to a sudden change in the quantity of blood in the brain. The healthy action of the brain, more perhaps than of any other organ in the body, depends on a definite supply of blood. Either more or less than this, leads to disorder, especially if the variation is sudden and considerable.

In epilepsy, the change is sudden and extreme. Is it on account of too much or too little blood in the brain, that consciousness is temporarily lost? It may be either way, but I believe in the vast majority of cases, it is due to the latter—sudden anæmia. That a sudden anæmia of the brain, if it is extreme, is followed by loss of consciousness, is so well known as only to require mention. The question of interest, is not whether the anæmia will produce loss of consciousness, but whether it occurs in epilepsy. In the vast majority of cases I believe it does, though it may occasionally be due to the opposite condition, that is, hyperæmia or congestion. But in my judgment this is the exception to the rule. But I will for the moment assume that the loss of consciousness is due to sudden anæmia of the brain. The question arises now, how is this anæmia produced?

It is not caused by hæmorrhage, of course, nor is it produced in the same way as the anæmia which leads to the unconsciousness of syncope or fainting. This latter is caused by a temporary failure in cardiac action. But not so in epilepsy,

for in this disease the heart continues to act, at least in many cases, perfectly. The blood is sent freely toward the brain, but in some way is prevented from entering it in due quantity. In what way? Why, by a sudden contraction of the small muscular arteries with which the brain is supplied with such remarkable freedom. Of this, there now can be no reasonable doubt, in most cases. The arteries if not the veins, do contract in the way, and with the result supposed, in at least many cases of epilepsy. This admitted, the next question to be answered, is, as to the cause of the contraction of the muscular arteries. I have no doubt, it is on account of an irritative influence conveyed to them through the channel of the vaso-motor nerves, distributed to these vessels. They are liberally supplied with them. Where does this sudden flux of influence come from? It can come from no other source, it is probable, than the vaso-motor centre for the head, or more exactly as I think for the brain, which lies either in the cervical portion of the spinal cord, or in the medulla oblongata—and I am inclined to think the latter; and this I say with full knowledge of the researches of Budge and Waller, Bernard, Brown-Sequard, and many others, as to the seat of the cilio-spinal centre, and other centres in the cord. I do not think that the vaso-motor centre for the face and external structures of the head, is necessarily or even probably the same as that for the brain, though I do think that if they are distinct, that they are closely related to each other. But at any rate the influence conveyed to the arteries of the brain, which causes them to contract as they do, starts from a definite vaso-motor centre, either in the upper part of the cord, or in the medulla oblongata. I know that injuries of the cord, much lower down, may lead to epilepsy, as the experiments of Brown-Sequard and others have shown; but it is not because injuries done so low down have directly affected the centres from whence the vaso-motor nerves of the vessels of the brain proceed, but because of an extension of the disorder caused by the injury up to a point at which the centre in question becomes secondarily involved. But after having somewhat indefinitely, it is true, located the vaso-motor centre for the vessels of the brain, the question next in order is, what causes this centre

to act? What causes it to emit such a sudden tide of nervous force or influence? I have no doubt that it is excited to action by an impression conveyed to it from some more or less distant quarter, and hence that its action is reflex. As regards the centre itself, it may be in a morbidly excitable state, but it does not act of its own motion. Now, where does the influence come from. that causes the centre in question to act? I have but little doubt that it may come either from the peripheral nervous system below, or from the brain above. But here I must pause for a few minutes, until I have considered the convulsive movements, for we will find that the same question will have to be asked, and if possible, answered, in regard to the final origin of the convulsion of the voluntary muscles. Before I pass to consider the convulsions however, I must for a few moments return to consider some points connected with the loss of consciousness. At first it was said to be due to a sudden anæmia of the brain. But this will not explain the later stages of the loss of consciousness in severe epileptic seizures, though it will do so in cases of the *petit mal.*

In most severe cases, the respiration is embarrassed, on account of either laryngeal spasm, or spasm of the muscles of the chest. So imperfect is the breathing in such cases, that the blood becomes speedily carbonized, as is indicated by the livid appearance of the surface of the body, more particularly of the face and head. This lividity is not wholly due to a carbonized condition of the blood, but partly to venous congestion, caused by the rigidity of the thorax or embarrassment of breathing, which prevents the transit of venous blood to, and through the lungs, and hence causes a sort of backwater action in the veins, which leads to distention of the veins of the neck, face, and head, and sinuses of the brain, as well as of the veins of other parts of the body.

The effect on the nervous system of the carbonic acid accumulated in the blood, is probably twofold: *first*, to stimulate powerfully, in a reflex way, to the resumption of action on the part of the respiratory muscles, and, *second*, to benumb, by a kind of anæsthetic action, the excitability of the nervous system. But it is of the second kind of action of the carbonic acid I desire more particularly to speak.

The benumbing effect on the system of which I have spoken, not only operates to cut short the convulsions, by reason of diminishing the reflex excitability of the cord, but also to perpetuate the loss of consciousness, that depended in the first instance on sudden anæmia of the brain. It now depends, at least in part, on the anæsthetic effect of the excess of carbonic acid in the blood. But in a few minutes as a rule, the convulsive movements cease gradually, and then completely; the breathing, at first slow and difficult, becomes fuller and more frequent, with an occasional full respiration. The livid appearance of the surface slowly disappears, graduating into a red flush, especially about the neck, face and head. But still the stupor continues, notwithstanding the vessels of the brain, as there is ample reason for thinking, are as large or larger than in health, and notwithstanding the blood once more is freely oxygenated. What still maintains the loss of consciousness or stupor?

Whatever it may owe to other circumstances, it seems to me it is in part due to the now enlarged state of the vessels, both arteries and veins in the brain, so there is now, as was not true before, too great pressure in the brain. The muscular vessels have temporarily lost their *tonus*, and are as much larger than they ought to be as they were before too small, at least in certain parts of the brain. This pressure, equally with other kinds of intra-cranial pressure, if excessive, leads to coma or stupor, say, as in apoplexy. But, after a very variable period of time, the vessels slowly regain their *tonus*, and consciousness slowly returns, leaving the patient however, in case of a bad attack, for hours, or even days, with a confused, or even distressed feeling about the head; when under favorable circumstances the patient becomes usually well. So much then for the loss of consciousness, and the causes of it, and of the process of its return. Of course, in cases of the *petit mal*, the loss of consciousness depends simply on a sudden brief contraction, at least in the majority of cases, of the small muscular vessels, and not on defective oxygenation of the blood, etc., as in the severer attacks.

2. *The convulsions of the voluntary muscles.*

To have true convulsive, and if so, of course, involuntary

movements of the muscles, is a common thing in clinical experience. We have two classes of convulsive action of the voluntary muscles, namely, tonic or enduring, and clonic or intermittent contractions. Tetanus may be regarded as a type of the former kind, and epilepsy of the latter. The difference between the two kinds of action is not to be sought in the muscles themselves, but rather in the action of the nervous apparatus, by which the contractions are abnormally as well as normally excited.

There is one important fact in relation to the groups of muscles usually involved, that should be considered. It is that the respiratory muscles, or rather those innervated from the medulla oblongata are involved, if any are in epilepsy.

Even in most cases of *petit mal* there is some convulsive disorder about the throat or larynx, or in some of the muscles connected with respiration, and whose action is bilateral, or, symmetrical. This is true, whether the muscles of other parts of the trunk, or of the limbs, are involved or not. This fact is important, as showing what motor centres are most commonly involved, and hence, what is the most common seat of the disorder, so far as the disordered action of the muscles go to show it. It is the medulla oblongata. By almost common consent, these times, the medulla oblongata has been admitted as probably the chief seat of the disease, the true *nodus epilepticus*.

That the muscles of respiration are chiefly innervated from the medulla oblongata, there can be no question, and since the experiments of Nothnagel;* not to mention the researches or observations of others, there can be little doubt, that in the floor of the fourth ventricle below the corpora quadrigemina, there is on either side of the middle line a centre, irritation of which will lead to general convulsions. It lies in close proximity to the general vaso-motor centre for the whole body, which has been shown, with considerable certainty, to exist in the floor of the same ventricle. (Owsjannikow, Kronecker, Dittmar, etc.)

---

* "Die Enstehung Allgemeinen Convulsionen vom und von der Medulla Oblongata aus." V. H. Nothnagel, in Berlin, *Virchow's Archiv.* Band 44, s. 1–12.

In a word, all that we know in relation to the essential seat in the nervous system of the motor centres, disordered action of which is the cause of the convulsive contractions of the muscles in epilepsy, would lead us to place it in the medulla oblongata.

Now, what can cause these centres to act as they do in producing the convulsive phenomena in an occasional typical attack of epilepsy?

To say the least, this action of the motor centres may depend on one or both of two conditions: Either it may depend on some structural, and if so, physiological peculiarity of the centres in question, or it may depend on some extraneous, perhaps remote influence exerted on them.

That it may in part depend on some physiological, and if so, structural peculiarity which renders them more liable to such kind of action than healthily constituted centres are, there can be little, if any doubt. We seem especially obliged to assume as much, when we come to consider what it can be that is transmitted in hereditary epilepsy. Unless some peculiar type of nerve structure is transmitted, especially as regards the motor centres in question, we cannot conceive what it can be. Of course, we know nothing of the nature, nor can we even demonstrate the *fact* of such a condition of the nervous centres, as has been supposed. But we seem obliged to *infer* its existence. This hypothetical condition may be said to consist in part in a peculiar unhealthy readiness to reflex action, in response to certain centripetal or other impulses. There is a morbid reflex excitability in them. The morbid excitability of the centres in question, may not only depend on an unnaturally responsive or unstable structure, but it may depend on at least two other circumstances: These are first, variations in the supply of blood, and second, the abolition during the unconscious state, of the inhibitory or restraining power of the brain, over the centres in the medulla oblongata. Let us consider these two cases in some detail.

I. Variations in the blood supply of the centres in question. One of the prime conditions, in respect to the action of almost any organ of the body, is a due supply of blood. This is true in an eminent degree of the nervous centres, especially

those which are most active. No other parts of the body are so well supplied with blood for nutritive purposes, it is probable, as the nervous centres. None are so sensitive to changes in the blood supply.

Now it is not my purpose, at least in this part of my lecture, to discuss the various facts which would seem to support the views I am to set before you at this point; I will try to do this presently. My opinion then as to the state of the vascular supply of the motor centres in the medulla oblongata, which are involved in epilepsy, is that in the ordinary way they are supplied too freely with blood, and this may be the condition at the time of the attack. The capillary and small muscular vessels are larger than they should be, as has been abundantly demonstrated in such post-mortem investigations as those of Schrœder van der Kolk. In this way the excitability of the nervous centres is constantly maintained above a healthy level. While this is the ordinary state of the nervous centres in the medulla oblongata, and may even be the condition at the time of the attack, yet at the moment of the attack I believe there may be sudden anæmia produced by spasm of the vessels, much the same as in the cortex of the brain. But what causes this supposed spasm of the vessels of the medulla, provided it occurs? I have no doubt that the contraction is induced by means of an influence conveyed to the vessels along the related vaso-motor nerves. The influence which these nerves are supposed to transmit proceeds from a vaso-motor centre, perhaps in the medulla itself, and the centre itself no doubt acts under an impulse conveyed to it from some other part of the nervous system, or in other words, the action of the vaso-motor centre is reflex. If we inquire into the origin of this action, we find ourselves face to face with the question that was raised in regard to the cause of the contraction of the vessels of the brain that led to anæmia of the brain, and so to a loss of consciousness. But I will postpone an attempt to answer this question for the present. I will soon return to it. I will now give attention to the third condition on which the morbid action of the motor centres of the medulla oblongata may depend, viz.:

II. The sudden withdrawal of the customary inhibitory in-

fluence which the brain seems to exercise over the subordinate centres of the medulla and cord. This factor in the case, it seems to me, has not received the attention it is entitled to. That the brain does exercise normally a constant restraining or inhibitory influence over subordinate cerebro-spinal centres, there would seem to be but little room for doubt.

The effect of such an influence is to prevent or control action in a subordinate centre that would otherwise occur with unrestrained freedom. The converse of this is that, if this influence is removed, the subordinate centres will act more readily than natural.

This I believe to be one of the factors in epilepsy. Under such circumstances, the centres of the cord and medulla oblongata act from comparatively slight causes. The morbid action then of the motor centres of the medulla in a certain sense, it is probable, depends on the three conditions mentioned:

1. On some intimate structural peculiarity, which renders the part liable in an unhealthy degree to reflex action.

2. On an unhealthy blood supply, which includes as the ordinary condition hyperæmia, and possibly as the condition at the moment of the attack, anæmia through vasal spasm.

3. Removal of the inhibitory or restraining influence of the brain over the centres in the medulla oblongata, which are the chief seat of the disorder.

But all these conditions, it is probable, are not sufficient, alone, to lead to the convulsive action. There must be *some special excitant* to action on the part of the motor centres involved, whose aptitude for reflex action has been increased by an unstable type of structure by an unhealthy supply of blood, and by the removal of the restraining power of superior centres. This excitant, it is probable, can be none other than a nervous impression or influence conveyed into them from some other part of the nervous system. And this is true not only for the muscular motor centres in the medulla oblongata, but as we have already seen, for the vaso-motor centres situated there also. Both kinds of motor centres act in obedience to an impulse *ab externo*.

The next question to be answered then, is as to the origin

of the excitant impulses, that rouse into action the two kinds of motor centres to which I have referred.

As regards the medulla oblongata, it is, in connection with the pons varolii, the common centre for the whole cerebro-spinal axis. We may, for sake of illustration, compare this nervous system to a magnet, in which case the spinal cord would represent one pole connected with our physical organism, and the brain proper the other pole connected with the mind, while the medulla is the intermediate, not to say neutral region, through which, in part, the extremes establish or exchange relations. It is the *nœud vital*, or "vital knot" of the organism. Occupying the middle ground of the cerebro-spinal axis, and having close relations with the brain on the one hand and the spinal cord on the other, it may, and does, receive impulses for either extreme. And in case of epilepsy, I doubt not it may, and does, receive impressions from either direction. In other words, the source of the morbid impulse that excites the motor centres of the medulla oblongata to unhealthy action, may come either from the spinal cord, spinal or cranial nerves, but especially the former, or from the brain above.

Now, what are the facts in regard to the source of the excitant impulses in question? They are, in brief, that disease or injury of the spinal cord, as the experiments of Brown-Sequard, Westphal and others on Guinea-pigs, and as many pathological observations have shown, may cause epilepsy. Also, it is well known that irritation of sensory, and perhaps other, and particularly cerebro-spinal nerves, may lead to epileptic attacks, in some cases producing the phenomenon called the "epileptic *aura*."

The peripheral irritation that causes the centripetal impulse, which, when it reaches the motor centres of the medulla, leads on the one hand to reflex spasms of the muscular vessels of the medulla and brain, and on the other to the convulsive action, may arise from injury or disease of a special nerve trunk, as has often been observed, or from irritation produced on the peripheral terminations of nerves of the stomach or bowels, or genital organs, and of many other parts of the body, or in the nerves of special sense. This class of irritations has long

been recognized, and the books are crowded with examples of it. This, then, is, or may be, one grand source of the morbid nervous impressions which, in a reflex manner, cause the vascular and muscular phenomena of epilepsy, which I am trying to explain to you at this time.

The second source, is that of the brain itself. In this case the irritation is supposed to be located in some part of the brain, either in the great ganglia at the base of the brain, or, as is probable, in the cortex of the same. It is only in recent times that this view of the case has received much attention. Of all other observers, Dr. Hughlings Jackson, of London, has done more than any other one, perhaps, to invite attention to the brain as concerned in epilepsy. He supposes, for example, that the cortex of the brain in epilepsy is often the seat of limited disease, which is of such nature that the affected part of the brain, more or less, gradually stores up nervous force, which at a certain time is discharged — if you please as a Leyden jar is discharged — downward on the motor centres of the medulla, perhaps, in such a way, that by reflex action, not only the convulsive but the vaso-motor disorders are produced. Such lesions of the cerebral cortex he would call "discharging lesions." For my own part, while I do not doubt that the brain may be the seat of lesions, which in a reflex way produce epileptic seizures, yet I do doubt the truth of Dr. Jackson's hypothetical explanation of the morbid process in the cortex. Such lesions of the cortex, if they exist, would require a gradual storing up of nerve force in the diseased part, until its tension becomes so great that we have relief by a discharge along the fibres leading from the cortex downwards to the motor ganglia at the base of the brain or even to those in the medulla, in this way rousing them suddenly to action, as we see in epilepsy. Have we any good reason for thinking that such "*discharging* lesions" exist in the cortex of the brain? I think not. There is really no more evidence of it, so far as I can see, than there is of a "discharging" lesion in the medulla, or in the spinal cord, or in diseased part of a peripheral spinal nerve, from which the *aura* appears to start. It seems to me no more difficult to understand how one kind of source of irritation should act occasionally or irregularly

than another. And certainly Dr. Jackson does not appear to think of discharging lesions for the spinal cord and peripheral spinal nerves, which are often the sources of the irritative action that constitutes, apparently, the first step in a typical attack of epilepsy.

You may be ready then to ask me how I would explain why lesions of the cortex—admitting their existence—act in the sudden fitful manner ~~they must~~ do, in producing occasional epileptic seizures. For my own part, it seems to me far more probable that the cause of the discharge from the lesion of the cortex, is due to a sudden vaso-motor disturbance in it, rather than to a gradual storing up of nerve force, until finally the tension becomes so great as to lead to a discharge on the motor centres below, either with or without provocation.

It is just as easy to see how a *part* of the brain, especially if modified by disease, might act in such a way, as it is to see how the whole brain is affected in a similar way suddenly, when consciousness is lost, as it is in most cases of epilepsy.

This would make the final action or discharge to depend on a sudden modification in the blood supply of the diseased part, produced through the agency of the vaso-motor nervous system. This leads us back again to the vaso-motor nervous system as the source of the influence that leads to modifications in the circulation of injured or diseased parts of the nervous system, whether peripheral or central, that become the starting-points of the morbid nervous impulse, the which when it is transmitted to the motor centres of the medulla oblongata, leads by reflex action, perhaps both to the vasomotor disorders that belong to the disease, and to the convulsive phenomena.

In this view the vaso-motor nervous system is, in an important sense, the proper seat of the disease. And this view I do not think is improbable.

To recapitulate what has been said, typical epilepsy presents us with two leading phenomena: loss of consciousness, and convulsive action of the muscles, which it has been my endeavor to explain. As regards the loss of consciousness, it was said to be due to one of two conditions, either too much or too little blood in the brain; in either case, due to a morbid influence

exercised on the muscular vessels by the vaso-motor nervous system. This influence was believed to proceed from a vaso-motor centre for the brain, located probably in the medulla oblongata. And this centre, it was supposed, was roused to action in a reflex way, by an impulse from some more or less distant part of the nervous system. As regards the convulsive action, the centre, or essential nervous seat of the disordered action, was believed to be in the medulla oblongata. The conditions on which the morbid action of the motor centres of the medulla appeared to be dependent, were of two kinds, *permanent* and *occasional*. The former were said to be some actual, but as to its nature, unknown structural change, predisposing the centres in question to reflex action; and besides this, an undue supply of blood, a constant hyperæmia. The latter were said to be, first, a sudden anæmia of the centres, produced for a brief time through vasal spasm; second, the removal of the inhibitory power of the brain, while consciousness is lost; and, third, an impulse to action, which the centres received from some remote quarter of the nervous system, as already described. The impulse that has been spoken of as coming from some distant part of the nervous system, it was said might come from either the spinal cord, or any of the spinal or cranial sensory nerves, or from the brain, especially its gray cortical substance. But no matter whether from the one direction or the other, some *lesion* of the nervous system, or some habitual irritation of a definite part of the nervous system, must exist as the *fons et origo* of the morbid impulse, the which when it is conveyed to the medulla, will excite in a reflex manner the morbid phenomena it has been my endeavor to explain. But why is the action of these supposed nervous lesions to such a degree intermittent as it is? Months may pass between the attacks. Why not act all the time, or oftener, if they act at all? I am not able to answer this question. I have said to you already, however, that it appeared probable to me that the action of the diseased parts — say in the cortex of the brain — depended immediately on some sudden change in blood supply. This would throw the responsibility once again on the vaso-motor nervous system. But while this might be the true explanation of the intermittent action of the dis-

eased centres, yet it does not answer, it only postpones our question.

We still may ask, why does the vaso-motor nervous system act on the vessels of such parts in an intermittent way?

I cannot answer this question, and I do not know that we should seriously try to answer it, until we are more sure that it is a legitimate question. One thing you should always remember when confronted by a question, is that you have the right, and it is your duty, to inquire into its antecedents before you attempt to answer it. It often turns out that a question involves only the form and not the substance of a real inquiry. And so we will not trouble ourselves to answer the question above raised until we can be more sure than we now are, whether we are on the right track or not. But hypothetical as much of what I have said to you may be, I am not without reasons for believing the views expressed to be somewhere near the truth. I will now give you some of those reasons:

1. Because the views I have given you harmonize with the results of experience in the treatment of the disease. Of all the remedies thus far employed against epilepsy, the bromides have with justice acquired the most reputation. How do they act, so far as we know at present? By causing contraction of the muscular blood-vessels of the brain, and medulla and cord, especially the former. The bromides do this probably through an influence they exert on the vaso-motor nervous system, or certain parts of it. Now, I have said to you that the ordinary state of the vessels of the medulla oblongata is one of hyperæmia. The fact that such remedies are successful as diminish the calibre of the blood-vessels in question, goes to establish the correctness of the view that I have given you. I need not speak of the effect of other remedies for the cure of epilepsy, unless it be the nitrite of amyl. This agent has not been employed for the cure, but only for relief at the time of the attack. It has been found useful in cutting short the paroxysm. How does it act? Under its influence the blood-vessels of the brain, and perhaps the medulla oblongata, enlarge, so as to produce hyperæmia, or congestion of the vessels of the parts described.

This fact as to the mode of action of nitrite of amyl speaks plainly in favor of the truth of my statements as to the condi-

tion of the blood-vessels of the brain at the commencement of the attack. In brief, then, the remedies for epilepsy, so far as we understand their action, go to establish the view that has been just taken of its pathology.

2. It is also supported by elaborate experiment. Take if you please the experiments of Kussmaul and Tenner. These consisted in depriving, experimentally, the brain and medulla of blood, in part or altogether. Upon tying or compressing the carotid or vertebral arteries, or both, in rabbits or dogs, they immediately fell into convulsions, truly epileptic in character, which ceased immediately on admitting blo d again to the nervous centres. These experiments were repeated a great many times, and with every precaution, and in various ways, and generally with the same result. It was conclusively proved that if the anæmia was suddenly produced, and carried to a certain point, that the convulsions began to cease at once on the re-admission of blood to the vessels of the brain and medulla. There could be no doubt in the experiments as to the relation of antecedent and consequent, of anæmia and convulsions. I have no time now to go at length into a discussion of their experimental results, or those of others, nor to discuss clinical observations made on man, especially in case of severe and sudden hæmorrhage and its effects. But I may say that the views I have been placing before you are as fully supported as could be expected by the experiments mentioned. They not only confirm the explanation of the cause of the loss of consciousness, but also the hypothetical view as to the condition of the medulla at the time of the attack; that is, that there is anæmia by reason of vasal spasm, and it makes no matter how the anæmia is produced, only so it is produced suddenly.

3. The views I have been placing before you as to the pathology of epilepsy are also supported by its pathological anatomy. I would now more particularly refer to the observations of Schrœder van der Kolk, notwithstanding they are somewhat old, on the condition of the small vessels of the medulla after death. They were invariably found enlarged. This agrees with the statement I have made to you, that the ordinary state of the vessels of the medulla is one of hyperæmia, or too great

fullness. The same may be said of the observations of Westphal, Echeverria, and others. In case of animals, where epilepsy was artificially produced, not only was an enlarged and congested state of the vessels of the medulla present, but also many small hæmorrhagic clots were found, not only in the substance of the medulla, but also in the upper part of the cord. This is just what might be expected, after the sudden contraction of the small muscular vessels at the moment of the attack. Afterward they would relax to an unnatural degree, and all the more so in consequence of the previous contraction. I am well aware that many who have given careful attention to the subject now under discussion, hold to the opinion that anæmia of the medulla does not occur in epilepsy at the moment of the attack, but only hyperæmia. This may be the true state of the case, and it would not make much practical difference in my view of the case. But, for the present, I am inclined to admit the anæmia at the moment of the attack, though most of the analogies seem to point the other way.

If we deprive the spinal cord of blood, or the brain, we embarrass or stop their action, and why not that of the medulla? I cannot now give you my reasons why, in spite of such analogies, I am inclined to admit anæmia of the medulla as one of the initial factors in a full epileptic attack.

4. Then again the fact that confirmed epilepsy may be, and in fact often is, transmissible hereditarily, sustains the view taken as to some radical change of the type of structure of certain parts of the nervous system, because only structural peculiarities, and what they imply, so far as we know, are transmissible in this way.

Besides such facts as have been mentioned, there are others that in an equal manner support the views set before you.

But I must now tell you that much of what I have been saying to you, is as yet hypothetical, and so awaits positive proof. When the facts are fully known, if ever they are, they may call for the adoption of new views in regard to the pathology of this important disease. But, until we have views thoroughly based on facts, we must form those that seem most rational on the basis of the facts we have. The province of hypothesis,

or inference, is legitimate, and highly useful if not abused, as it so often is, and nowhere is it more necessary at present than in medicine, especially in dealing with questions which lie partly in the *terræ incognitæ* of the nervous system.

Art. II.—APHASIA.

By A. D. Rockwell, M. D., New York.
Electro-Therapeutist to the Woman's Hospital of the State of New York.

PRELIMINARY to a few practical considerations concerning aphasic symptoms, I call attention to the following cases which serve as texts for all that I have to offer:

By invitation of Dr. E. R. Peaslee, I saw in December, 1873, a Mr. A., a gentleman somewhat advanced in years, and who was suffering from right hemiplegia with complete aphasia.

About a year previously he was taken with left hemiplegia, but there was no accompanying aphasia; his speech was quite clear, and he rapidly progressed toward almost complete recovery.

Two months prior to the date when the patient fell under my observation, paralysis of the right side suddenly supervened, associated, as I have already remarked, with aphasia.

The intellect remained measurably quick and clear, but *da da* was the only utterance that the patient would attempt. When he essayed to write, the result of his efforts were manifested only in a meaningless combination of letters.

The diagnosis was: Lesion of the anterior lobe of the brain, probably the third frontal convolution, and the prognosis decidedly unfavorable, if not absolutely discouraging. Treatment by the galvanic current, which was for a short time carried on at the earnest solicitation of friends, resulted in no benefit.

I was consulted December 7, 1873, by a lawyer aged fifty-three. One morning, some eight months prior, he arose in

his usual health and for some hours attended closely in his office to a press of business that had accumulated during a few days' absence from the city. While thus engaged he observed that his right leg was a little numb, and that there was a disagreeable sensation of tingling in the fingers of the right hand. Almost immediately he felt that his whole right side was paralyzed, and, on attempting to speak he found that he could not co-ordinate intelligible expressions. In a few days the patient regained almost the normal power over the paralyzed members, but his speech returned more slowly, and for three months before I saw him there had been little perceptible progress.

He could speak short, disconnected sentences well enough, but when he attempted to engage in animated conversation, he not only constantly used words that utterly failed to convey his ideas, but frequently all remembrance and power of expression seemed to forsake him, so that he was unable to proceed until reminded of the proper word and the thought that he had been expressing. The patient was treated for about a month by central galvanization, and with very marked benefit. The improvement in speech, which had ceased for three months, became again manifest, so that in a few weeks he could converse with much greater readiness. To this day, however, considerable difficulty in co-ordinating words and ideas remains.

I refer lastly to a poor man who became aphasic during convalescence from a severe attack of typhoid fever.

This patient, while working as a common laborer in the city of Pittsburg, was prostrated in October, 1873, and was at once removed to a hospital.

During the first two or three weeks of a rather tedious convalescence, no change in the character of his speech was observed, but shortly before his discharge, and while feeling that strength was surely returning, he noticed a slight impairment of the co-ordinating power of expression, which day by day increased in degree until he lost almost completely the power of intelligible converse.

He came to New York in February, and on the 21st of March he was sent to my office. At this time he had been aphasic for ten weeks, with no symptoms of improvement.

The patient was anæmic, there was decided œdema of the lower extremities, and the heart's action was violently irregular, although this was not due to any organic cardiac disease.

On general principles I submitted him to general faradization daily. The immediate results of this treatment, *i. e.*, those that followed within a week, were an increased flow of urine, disappearance of the œdema, and increased regularity of the heart's action. He began to improve in his speech at the end of the second week of treatment, and in two weeks more he was able to converse with his usual fluency.

These three cases seem to me to be of interest as illustrating a number, although not all, of the various forms under which aphasia may manifest itself. In the first case both the paralysis and aphasia were complete and persistent. From the beginning there had been no change for the better, and the future offered no hope of even a partial recovery. It will be observed on referring to the case that the patient had suffered from two attacks. In the first instance the left side was affected, but, as is almost always the case, the paralysis was accompanied by no aphasia. The second attack was on the right side, and associated with complete aphasia.

These facts serve to recall the excited and interesting discussions that have arisen relative to the localization of the faculty of speech. In 1865 the subject was exhaustively considered by the Academy of Medicine of Paris, and although the discussion neither resulted in any general settled conviction in regard to the localization of the faculty of speech, nor satisfactorily decided the question whether any particular portion of the brain was the *invariable* seat of hemiplegia with aphasic symptoms, it yet served to throw much light on several disputed points, and to lead to a more correct appreciation of the therapeutical indications.

From the facts elicited at these discussions it was rendered evident that complete and persistent hemiplegia, associated with grave aphasic symptoms, similar to the case first detailed, depend on deep-seated and destructive organic lesion, situated, as a rule, in the third left frontal convolution of the cerebrum, or in its immediate neighborhood, and is not amenable to any form of treatment. Electricity, except so far as it may aid

nutrition in the affected limbs, is in such a case useless. Between such hopeless seizures as the above, and mild transitory aphasic symptoms without paralysis, there are manifestations of aphasia of various grades of severity.

Slight disturbances of speech unattended by paralysis disappear rapidly and without treatment, and if, as it is possible, a local change in the structure of the brain takes place, it comprises nothing more than some slight molecular disturbance. Following a somewhat graver and more deeply-seated central lesion, we have aphasia associated with paralysis, more or less persistent, but amenable to a greater or less extent to rest and treatment.

The second case is a fair illustration of such an attack, of the somewhat transitory character of the attendant paralysis, the greater persistency of the aphasia, and the benefit to this symptom that may accrue from treatment. Aphasia following convalescence from fever is illustrated in the last case. In the graver forms of aphasic hemiplegia, we clearly understand that there exist deep-seated and destructive lesions, and even in the milder forms we know that actual structural change or congestion is to some degree present. In aphasia following fevers, however, congestion as a cause is hardly possible, if we take into consideration the character of the onset and the attendant symptoms, and it is on the whole difficult to conceive of the nature of the lesion.

In 1820, Lordat, of Paris (who some years subsequently became aphasic), was the first to apprehend the true character of the affection, viz.: that it was due to a loss of the power of co-ordination, and not to actual paralysis of the tongue or muscles of the face. Bouillaud went a step farther, and located the faculty of speech in the frontal lobes. Subsequently, Dr. Marc Dax, in a paper entitled, "Lesions of the Left Half of the Brain Coinciding with the Loss of Memory of the Signs of Thought," asserted that the faculty of articulate language was exclusively located in the left hemisphere of the brain. He had never seen a case of left hemiplegia with aphasia.

Trousseau, in a most extensive hospital experience, met with but one case of left hemiplegia associated with aphasic symptoms, and which at that time he asserted to be the only one

recorded. Finally M. Broca located the faculty of articulate language in the third left frontal convolution, and claimed that organic disease of this special portion of the brain must necessarily be accompanied by aphasia. Now in regard to the ideas enunciated by the above investigators, it must be admitted that (with the exception of Lordat) they are but partial truths. That this affection which he termed "alalia" is due to an impairment of the power of co-ordination, and not to muscular paralysis, has never been doubted.

The conjecture of Bouillaud that the faculty of articulate language has its seat in the frontal lobes of the brain, of Dr. Marc Dax, that it is located in the left hemisphere of the brain, of Dr. G. Dax, the son, that not only is its invariable seat in the left hemisphere, but, more minutely, that the outer portion of the middle lobe is its true location, and, finally, the opinion of M. Broca that the posterior portion of the third left frontal convolution is the seat of the faculty of speech—all these conjectures are only so many steps to a clearer appreciation of the truth. So far as can be ascertained from physiological and pathological investigations, and from the records of clinical experience, it seems evident that no one minute portion of the brain can yet be claimed as the exclusive seat of the faculty of language, or of organic lesion in hemiplegia with aphasia. The truth briefly stated would appear to be this: 1st, Aphasia is as a rule, the result of injury to the frontal lobes; 2d, the left hemisphere is almost universally the seat of lesion; 3d, the posterior portion of the third left convolution is the most frequent seat of structural change.

The experiments of Fritsch, Hitzig and Ferrier, although yet of but little practical value to electro-therapeutics, have at least cleared up somewhat the pathology of aphasia. They not only show that the portion of the brain which presides over the faculty of the memory of words governs also the movements of articulation, but conclusively confirm the theory that in every essential point the brain is symmetrical. Its action is generally unilateral and crossed, but it is most significant that so far as it controls the movements of the mouth, its action is bilateral, which accounts for the fact that a one-sided cerebral lesion is not followed by paralysis of the muscles of

articulation. The opposite side of the brain performs the work of its fellow. How, then, it may be asked, can we explain the well-recognized fact that loss of the co-ordinating power of speech is universally associated with left cerebral lesion? In all probability it is due to this:—that as most people are right-handed so are they left-brained; and in lesion of the left hemisphere with aphasic symptoms, the memory of words is not totally destroyed, since the seat of this faculty is in the right side also, but the victim is without the power of articulate speech because the right side of the brain has been so little exercised as to be incapable of acting alone.

This theory helps to explain the occasional recoveries of speech in aphasia resulting from undoubted and serious lesion of the left hemisphere. The right side of the brain is educated in the same way that the left hand is educated when its fellow becomes disabled.

Art. III.—RESEARCHES ON THE FUNCTIONS OF THE BRAIN.

By MM. Carville and Duret.

Translated from the Gazette Medicale de Paris, by F. J. Huse, M. D.

IN two previous communications which we have presented to the Society of Biology we have endeavored to establish: First, that the authors, especially Prof. Ferrier, who have sought to demonstrate, by the aid of electrical currents, the existence of motor centres for the voluntary movements in the gray substance of the cerebral convolutions, did not protect themselves against certain causes of error, and in particular, against diffusion of the currents; secondly, that when an animal was completely anæsthetized, the action of currents upon the gray cortical substance would not produce any movement. Hence, relying upon the theory adopted by most physiologists,

that anæsthetics paralyze especially the medulla oblongata and the gray nuclei of the base of the brain, we might conclude that the electrical currents failed to act in such a case because the nuclei were paralyzed, and consequently when currents were applied to the surface of the hemispheres it was these nuclei which they excited, and not the gray substance of the periphery.

Upon the present occasion we purpose: First, to briefly disprove the objections which have been brought against us from various quarters; secondly, to make investigations, by the aid of a more accurate method, as to whether there really exist certain centres for the voluntary movements in the gray substance of the convolutions; thirdly, to examine, by certain recent processes, the relations of the cortical substance with the corpora striata, thalami optici and the medulla oblongata.

I. In our former experiments we have demonstrated the diffusion of currents which were claimed to be confined to very limited portions of the gray substance, by collecting the diffused currents with the aid of a very sensitive galvanometer, and by measuring the deflection of the galvanometric needle. M. Dupuy also substantiated this diffusion by the aid of a galvanoscopic leg of a frog, which, applied upon the posterior portion of the hemisphere, contracted with violence when the anterior portion of the same hemisphere was electrified. This diffusion has been proven in currents even weaker than those which Prof. Ferrier employs in his experiments (helix withdrawn ten centimetres). We acknowledged, however, that the electricity diffused itself not only upon the surface, but also in the deeper portions; and that meanwhile a certain quantity of the electrical fluid seemed to follow, in this last case, some of the white fibres of the radiant crown of Reil.

An American physiologist, Dr. Putnam, believes, however, that he has demonstrated that weak currents do not pass beyond the gray cortical substance by the following experiment: He searches, by the aid of a weak current, the centre for the legs, for instance; then, these movements having been well established, he separates with his scalpel the gray cortical substance, the seat of this motor centre, by means of a section made into the white substance to the extent of two millimetres.

He then turns back this layer, and electrifies, *with the same current*, the surface of the section of the white substance thus denuded, and he fails to obtain any result. One of our observations which has already been published, answers this objection. After having scraped away the gray substance which, according to Ferrier, represents the centre experimented upon, it suffices to augment the current very slightly (one or two centimetres) in order to reproduce movements corresponding in extent with those preceding. Integrity of the gray layer is therefore not absolutely essential in order that currents may produce movements exactly resembling those which are caused by the excitation of electrodes upon the gray layer while still intact. Moreover the necessity of this slight augmentation of the force of the current is amply explained when we consider that the oozing of blood from the cerebral wound is nearly constant, and that the blood, being a saline fluid, is a good conductor of electricity, and promotes the diffusion of the currents.

In a second experiment, Dr. Putnam pressed down upon the white substance the strip which he had raised, and which was still adherent by one of its edges to the rest of the gray layer. He then applied the current upon the exposed or meningeal surface of this strip, but he failed to obtain any movements with weak currents. In this instance he claims that diffusion ought to take place just as if nothing had been done, and that if the current fails to act it is because the integrity of the gray layer is necessary in order that localized movements may be exhibited; it is by excitation of this gray layer alone that it can produce any results.

We shall only call attention to the fact that, in this instance also, the experimenter augments the causes of diffusion; it is impossible to prevent the presence of blood, or the formation of a clot under the strip, and, besides this, he has cut off the white fibres which act as conductors of the currents. Yet, if notwithstanding this section, he slightly increases the current (sufficiently to compensate for the loss occasioned by the section of the strip), the movements will reappear, as strong and as well localized as previously.

According to our experiments, the higher the section of the

white fibres is made above the centres of the surface, the greater is the necessity for employing a powerful current. Indeed, the quantity of electricity that penetrates below and turns toward the nuclei of the base of the brain, by probably following certain groups of white fibres, becomes more and more feeble. since it is gradually impaired in its passage by the losses due to the lateral diffusion. Therefore, if a section is made very far from its point of departure, it is evident that there must be a corresponding augmentation of the current in order to compensate for this waste, which is as much greater as the distance of the source of the electricity is increased. Finally, any section made in the vicinity of the radiating crown, must be accompanied by a profuse flow of blood, since, as one of us (M. Duret) has demonstrated in the course of investigations regarding the circulation of the encephalon, it is there that the largest arteries of the cerebral substance are found.

We have, however, another proof which appears to us to be still more convincing against the objections of Dr. Putnam that the integrity of the gray layer is not necessary for the production of localized movements by means of electrical currents. After having found, by the aid of a very feeble current (helix at ten centimetres), the centre of movements of the feet, we destroyed, by means of a cauterizing iron heated to white heat, the gray substance at the points where we had applied the electrodes.

But it was now sufficient for us to use *this same current* upon the eschar thus obtained, in order to again produce very pronounced movements in the members of the opposite side. In this case it was unnecessary to increase the force of the current, because there was no escape of blood to facilitate diffusion.

It is not, therefore, allowable to admit with Ferrier "that it is an artificially provoked excitation of the normal functional activity of the gray substance which produces movements," when the surface of the convolutions is electrified.

And hence we have said, not without reason, in our preceding communications, that the observations of Ferrier failed to demonstrate that the gray substance was excitable by electrical currents; since these continue to act after its destruction by cau-

terization. But if the observations of Ferrier fail to demonstrate in an indubitable manner the excitability of the gray substance, shall it be said that no centres for movements exist in the cerebral surface? We have endeavored to determine the existence of these centres in the gray substance by some experiments which are much more precise than those of Ferrier, and we now propose to outline in a few words the results which we have obtained.

II. *On the existence of motor centres in the convolutions.* While examining the experiments of Ferrier, our attention was particularly directed to the fact that in applying the electrodes upon various regions of the encephalon, we obtained different results—in one place movements of the feet, in another place movements in the face, elsewhere in the eyelids, etc. In order to explain this variation in the results obtained, we conceded that into these various portions of the gray substance special bundles of white fibres penetrate, following which the current would act upon another centre situated lower down. Thus, when we electrified the point indicated by Ferrier as the centre of movements of the opposite side, there was a special bundle of white fibres there to receive and conduct the current.

That our thought may be still better understood let us note what happens when the central extremity of a nerve of sensation is electrified, taking as an illustration the sciatic nerve of the right thigh. The current passes to the gray axis of the spinal cord, and there produces such a modification of the nervous cellules that a movement takes place in the extremity of the opposite side. In this case the electrical excitant is replaced by the normal physiological excitant. Furthermore, it appears to be demonstrated that the gray substance of the cord is unexcitable if acted upon directly by either mechanical or physical means. There must be, in short, a medium between the point of excitation and the gray axis, and this medium is found in the nervous tube (nerve, root or pillars of the spinal cord); if a nerve tube does not itself transmit the excitation no modification is produced. *The nerve cellule does not react unless it is excited through the medium of its nerve tube.*

The same condition exists within the brain; the gray sub-

stance of the convolutions, or of the cerebral nuclei, like the gray substance of the spinal cord, is not directly excitable; it is necessary that the excitation should come through the medium of the nerve tubes. In general, reactions are not obtained when the gray surface of the brain is electrized, unless because the subjacent white bundles convey the current to the gray centres situated lower down. These movements are varied according to the region which is excited, because the bundles connecting with each of these regions naturally follow a different course, and are also probably connected with different gray centres below.

When Ferrier, electrifying during a certain space of time a centre of the gray layer, produced a general epileptic attack of the opposite side, it is because the current diffuses superficially as well as deeply, and substitutes its action in the entire extent of the surface for that of the nerve cellules.

This diversity, however, in the disposition of the bundles of the crown of Reil is not the result of chance; it responds to a physiological requirement. It is therefore possible that at the cortical extremity of each of these bundles there responds a special group of nerve cellules, limited physiologically, if not anatomically.

We thus find ourselves brought back to the original idea of centres or excitable points in the gray surface of the convolutions. But there immediately arises a grave question—whether these centres of the gray substance are centres of voluntary motion, or simply centres of perception. Whatever may be their nature, however, the conductibility of the white bundles exists unchanged; it accommodates itself equally well to either hypothesis. It is then necessary to discover the kind of centres or excitable points which we have under consideration.

The electrical current furnishes an unsatisfactory means of experimentation, since, if it is as feeble as it ought to be, one sees that it diffuses. We have therefore had recourse to a well known procedure: the ablation of those regions of the gray portion which could be considered as centres; but we have so improved the operative method as to allow the animal to live several weeks after the operation. We reserve the descrip-

tion of this method and the publication of experiments in detail for a future memoir; we only propose at the present time to indicate the results which we have obtained.

Anæsthetizing a dog by an intravenous injection of chloral, we exposed the first external superior frontal convolution of the right side—upon which, according to Ferrier, may be found the centre of movements of the anterior and posterior feet of the left side. We sought, by the aid of a very feeble faradic current (helix at eight centimetres), the centre in question, and observed in a very careful manner movements of the digits of the paw and in the forearm of the anterior member, movements of extension being also exhibited in the posterior member. After having carefully studied and thoroughly examined five or six different times the movements thus obtained (no other point upon the surface of the brain, electrized in the same manner, produced these movements), we removed with a curette all of the gray substance down to the white substance; we even encroached upon the latter in order to obtain the certainty that all the gray substance corresponding to this centre had been entirely removed. After this ablation of the gray matter, we electrified the same region; it was bleeding, and yet it was sufficient to place the helix at six and a half centimetres in order to obtain exactly the same results. The wound was then sewn up with care, and the animal left to rest. This operation was performed at four o'clock in the afternoon.

In the evening, at half-past eight o'clock, the animal recovered himself again; he endeavored, seeing us, to stand upon his feet, but fell two or three times in succession upon his left side. He finally succeeded in maintaining an upright position, but he leaned to the left upon the back of the carpus of the anterior member, and upon the back of the tarsus of the posterior member. He then made several steps in the apartment, walking on the back of the wrist of the left side. The digits and metacarpus were flexed upon their radio-carpal articulation, and the animal supported himself upon their dorsal surface. There was, therefore, paralysis of the extensors. None of the muscles of the shoulder, nor those of the arm, appeared to us to be paralyzed. Before long the animal became more skillful; no longer having extensor muscles to raise his foot,

he threw it in advance and extended it by this singular procedure: as soon as his toes touched the ground he pressed upon them strongly by the aid of the flexor muscles; but at certain times he forgot his method and walked involuntarily upon the back of his carpus. Posteriorly the complete extension of the last segment of the member is not so necessary for making progress; and the animal also kept his paw fixed in a half flexed position; it trailed upon the ground, being carried slightly forward on account of the predominant action of the flexors. He often fell, as if from clumsiness, upon the left side.

The following day the animal ate a pound of meat with a good appetite; he walked for the most part upon the back of the carpus (of the left side), trailing his posterior paw.

The second day after the operation the dog was brought into the laboratory. He sustained himself quite easily upon his four feet and walked around very freely. He supported himself easily upon the two members of the left side, but we remarked that he often struck the back of the claws of his anterior left paw upon the floor. At the moment the digits touched the floor it seemed that there was a movement of sudden expansion by which he put them all down at once. The posterior paw also appeared to be still a trifle unwieldy. He did not walk, however, upon the back of the carpus, as he had done the previous day, except at very rare intervals, and he did not fall upon his left side except when he was about to turn quickly to that side. When he laid himself down toward the left he fell all at once like a heavy weight upon the floor. The fourth day there existed only slight weakness of the left side; he occasionally struck the digits of the anterior paw of this side against the floor, while on the fifth day he seemed entirely recovered from his paralysis. This recovery persisted until the tenth day after the operation, when he was subjected to a new experiment, which we shall indicate hereafter. At the autopsy the lesion of the convolution was verified; it was found to correspond very nearly with the region indicated by Ferrier.

Another dog operated upon in the same manner yielded us the same results, but died of hæmorrhage four days after the operation.

We may therefore deduce from these experiments the following conclusion: There seem to exist in the gray substance of the convolutions certain centres or points of excitation—for voluntary movements—but the paralysis produced by the ablation or lesion of these centres is transitory. For the explanation of the recovery of these paralyses we shall search further on.

III. *The relations of the centres of the gray substance of the convolutions with the gray nuclei of the base of the brain.* When, after having found the centre for the movements of the anterior and posterior paws of a dog anæsthetized by chloral, the experimenter makes a section through the peduncular expansion (internal capsule) at the level of the intra-ventricular nucleus of the corpus striatum, he fails to procure any movement by the application of the electrical current upon the convolution which is the centre for movement of the feet, whatever may be the intensity of the current. To make this section it is sufficient to introduce a small flexible instrument (a curette of red copper) through the corpus callosum into the lateral ventricle of the same side, it slips lightly to the surface of the ventricle, and when it is arrested by the external wall, by forcing in the curette the peduncular expansion is thus severed, at least in the anterior two-thirds of its extent. We have been so fortunate as to entirely succeed in this operation upon two occasions. The results obtained were entirely similar: this section absolutely prevented the currents from causing any movements. It therefore seems to be indicated by this fact, that the integrity of the peduncular expansion is essential to the manifestation of the action of electrical currents.

In two other cases, on the contrary, we removed the gray intra-ventricular nucleus almost completely, the peduncular expansion remaining intact. Now, after this operation, each time, the very weak currents (six to eight centimetres), were able to produce very decided movements in the feet of the opposite side. It appears from this circumstance that the currents follow the peduncular expansion and act below upon the nuclei of the protuberance and of the bulb.

After the section of the peduncular expansion we allowed

the animals to live, and we were able to observe them for two or three days. Each time the paralysis of the two members of the opposite side was complete and the animal failed to recover. In such a case the hemiplegia was characterized by absence of voluntary movements of the opposite side, and when the animal was raised by the skin of his back the two members on the right (the section had been performed on the right side) struggled in the air, while the two left members hung inert and motionless. If we endeavored to make him stand on his feet he would sustain himself upon the two members of the left side, which was the side of the cerebral lesion, whereas the two right members were flaccid, and if we had not held him up he would have fallen upon his right side.

Right here an important question presents itself: How is it that animals recover so rapidly when we content ourselves with removing the centres for movements of the feet in the gray substance of one of the hemispheres? How, on the other hand, do they remain hemiplegic when we make a section of the peduncular expansion at the level or above the corpus striatum?

A well-known theory originated in reference to those patients who may have been cured of aphasia, and revived by Brown-Sequard, Jackson, Broadbent and Ferrier, admits that the voluntary movements of the two sides of the body may be coordinated, for the two sides, in each of the hemispheres. We are supplied, following the graphic expression of Brown-Sequard, with *a double brain.* According to this ingenious theory, when a dog is deprived of the centre for movements of his feet, and recovers these movements three or four days subsequently, his recovery is due to the gradual substitution of the hemisphere of the side opposite the lesion; in other words, the hemisphere of the paralyzed side, for the injured hemisphere.

This theory being supposed for an instant to be true, we have endeavered to find through what set of fibres connection could be established between the two hemispheres. Three hypotheses suggest themselves:

A. It may be by means of the fibres of the left hemisphere (supposing the right hemisphere to have been experimented

upon), which pass on the right side through the vault of the corpus callosum and the white commissures, and which control this side by acting upon the corpus striatum, or which, simply passing around the nucleus caudatus, without having any connection with it, descend into the peduncular expansion (internal capsule) and the cerebral peduncle of the right side to act upon the nuclei of the protuberance and bulb.

B. The second hypothesis is that the fibres of the left hemisphere supply this deficiency of the cortical substance of the right side by descending into the peduncular expansion, and the internal capsule of the same (left) side, act upon the nuclei of the protuberance and bulb of the right side, after their decussation, and then proceeding to the right, (the side which is not paralyzed in the hypothesis we are considering) arouse at the same time their near neighbors, the centres on the left side of the gray bulbo-medullary axis.

C. The third hypothesis is that the supply of the deficiency of the gray centres of the surface of the hemispheres is maintained by the action of the gray intra-ventricular nucleus of the corpus striatum that is situated in the injured hemisphere.

A. The first hypothesis, however, may be rejected. Indeed, in the case of the dog subjected, as already mentioned, to the removal of the centre for the feet, and who, after a temporary paralysis, was entirely cured the third or fourth day, and remained in that condition for seven or eight days longer, we had cut the vault of the corpus callosum throughout its entire extent. It was evident that if the substitution by the left hemisphere (the centre for the feet having been taken from the right), was accomplished by means of the commissure represented by the arch of the corpus callosum (fibres of the corpus callosum connecting with the corpus striatum or passing to that side), this section should hence have caused the reappearance of paralysis of the members of the left side.

As the animal was not anæsthetized we were able to study the effects of this section (verified by the autopsy) half an hour after the operation. Now, after this complete section of the arch of the corpus callosum the animal could walk about the apartment; he had perfect control over his limbs; not one of them was paralyzed. We observed this absence of paralysis

throughout the entire evening, and also in part the following morning; but he died the afternoon of the next day from hæmorrhage into the ventricles.

It appears, therefore, that the supply by the left hemisphere of the deficiency of the right, the fact of its existence being taken for granted, does not take place through the arch of the corpus callosum. It is probable that the arch of the corpus callosum is only a commissure between the intellectual centres of the two hemispheres.

B. The second hypothesis we also seem bound to reject. We have not yet made an experiment in this direction, but we can, in denying it, avail ourselves of a well-known clinical fact. Prof. Charcot has some time since established that cerebral hæmorrhages happen most frequently in the vicinity of the corpus striatum, within the internal capsule, and one of us, (M. Duret,) in his work on the circulation of the encephalon, has explained the cause of the frequency of hæmorrhages in this region. If the internal capsule (foot of the peduncular expansion) is completely severed, these patients are always seized with hemiplegia of the opposite side, and this hemiplegia is incurable.

In these cases, therefore, the substitution by the hemisphere of the opposite side of the function of the injured hemisphere does not take place, and yet the peduncular expansion, the internal capsule, the peduncle itself of the healthy hemisphere, are intact. It is then necessary to acknowledge that the second hypothesis is not admissible, and that it is neither in the nucleus of the bulb or of the cord that this substitution takes place.

Now, since neither the corpus callosum nor the peduncle of the hemisphere opposite that which is the seat of the lesion constitute the regular course of the nervous influx in the suppositious substitution of one hemisphere for the other, and since no other line of communication exists between the two hemispheres, it is readily deduced that *this substitution does not really exist.*

C. There remains the third hypothesis: That the gray intra-ventricular nucleus of the corpus striatum is a second centre for the voluntary movements, a centre of re-inforcement or of

concentration, through connection with dispersed centres at the surface of the convolutions. This hypothesis harmonizes with clinical observations; for, as we have already stated, the hemiplegia is persistent when the peduncular expansion is destroyed by the effusion of blood; but, in these conditions, the fibres which are given off from the nucleus caudatus, and which go into the peduncles, are also destroyed, since they pass into the internal capsule; and it is this that accounts for the impossibility of recovery. Moreover, it is a quite frequent clinical experience to encounter lesions, either in the external capsule or in the nucleus caudatus, from which the patient recovers without manifestation of hemiplegia for any length of time.

We purpose communicating to this Society on a subsequent occasion, some experiments upon animals that demonstrate the truth of this hypothesis.

If one admits these facts, drawn from experiments which we have carried out, in connection with Dr. Veyssiere, and which he has embodied in his inaugural thesis upon "Hemianæsthesia of Cerebral Origin," he will see that the anterior portion of the peduncular expansion contains the conducting fibres for voluntary movements (those which come from the cortex of the convolutions or from the nucleus caudatus), while the posterior fibres are sensitive fibres. Indeed, the section of the posterior third of the peduncular expansion at the level of the optic thalamus always produces hemianæsthesia of the opposite side.

The clinical facts reported by Dr. Veyssiere (service of Prof.'s Charcot, Vulpian, and L. Turk) accord admirably with the results of experiments upon animals.

(Observations made in the laboratory of Prof. Vulpian.)

Art. IV.—ILLUSTRATIONS OF HEREDITY; INFLUENCE OF BOTH PARENTS ON THE CHILDREN.

By Ransom Dexter, A. M., M. D., Chicago.

IN calling the attention of the medical profession to a few remarkable cases of the pernicious influence of the use of alcoholic liquors by parents upon the mind and body of their offspring, it may not be out of place to indicate in the premises the factors through the action of which such conditions may be transmitted. It would be superfluous to bring forward evidence to show the hereditary tendencies in the constitution of both the body and mind under normal laws and circumstances, these facts having long since been settled by physiologists. The questions, however, relating to the hereditary transmission of temporary or acquired parental peculiarities, are not as fully recognized as they should be.

The following appear to me to be the essential conditions under which parental characteristics may be expected to be transmitted:

1. The natural healthy constitutions of father, mother, and their ancestors, are blended in their offspring.

2. The offspring of healthy individuals are likely to inherit the cast of the more strongly constituted parent, or the particular organs most highly developed as they may appear in either of them.

3. In the acquired constitutional change, whether of disease or development, the impression may be so strongly made that the tendency to reproduce it again, is stronger than to reassume the normal condition.

4. Strong mental impressions of either parent, though of comparatively short duration, may prove to be dominant in the offspring.

5. There may be a duality in some instances, of mental impressions in the offspring on the same subject, having resulted from conflicting influences in the minds of the parents, as the following cases will serve to illustrate.

6. That parties whose ancestors have been drunkards, and who are constitutionally affected from that influence, show it in the lineaments of their bodies, as well as in their mental peculiarities.

Through the consent of a grandchild of E. T., I have permission to report to the medical profession, the following piece of family history, illustrating the baneful influence of alcoholic excesses, transmitted to the second, third, and fourth generations.

Case I.—E. T., the first link in the chain of descent we describe, was a wealthy lumberman, descended from a highly respectable family, in which we have no account of any pre-existing nervous or mental disorder. Notwithstanding the fact that the habit of drinking was much more general among the better classes in our country sixty or seventy years ago than it is at present, there is no evidence to prove that he was, to any extent at least, the victim of heredity. Genteel, affable and kind in his manners, he married at an early age, and commenced business with a fair prospect of success. Under the influence of associations however, in the course of a few years he became confirmed in drinking habits, which in his case took on a periodic character, about two weeks being spent in a state of intoxication, alternating with about the same time in which he would drink but moderately. When intoxicated, he appeared to possess a mania to abuse his family. If possible, it was a greater luxury to him than the use of the alcoholic liquors he drank. With his mind stimulated to such an unnatural strain, and he striving continuously to render his abuse, by every means he could devise, as intense as possible, he became an object of horror at these times, to his wife and all others with whom he chanced to meet. He was so violent at times that it became necessary for all with whom he lived to leave their home, and seek other quarters.

This state of their domestic relations remained as described five or six years, when a son, unfortunately for many others, was brought into existence. This son, J., early in life manifested many very peculiar eccentricities; while but a lad, he would study to annoy his mother and other associates, devising every plan at his command to make trouble, but if it

passed unnoticed, he would then exhibit his intention by violent abuse. But when he attained the age at which his father began to drink excessively, he then manifested every trait of character possessed by his father after he had become a drunkard, with one exception, namely, that he had his mother's aversion, which was exceedingly strong, to the use in any way whatever, of alcoholic liquors. This son would not touch a drop of spirituous liquors, and would fairly detest any person who would, and yet he could not avoid his two weeks in every month of *mania* to abuse and annoy his family, which was carried to as great an extent, and in the same way as his father, but without ever having tasted a drop of alcohol. His family consisted of a wife and eight children, two of whom died while quite young; of the remaining six but one possesses the father's habits, and that one has them in every particular. In this one the horrid and detestable traits of character crop out as in the grandfather a half century ago.

The fourth grandchild in this family history has a son four years old, in whom both the physical and mental characteristics of his great-grandfather, after he had become an inebriate, are brought out in every particular.

Of the six adult grandchildren the inebriate traits of character are impressed upon only one. There are now nine great-grandchildren and only one well marked case of this peculiar heredity.

Case II.—N. J., the subject of the following peculiar history, has attained the age of about forty; both he and his ancestors were healthy, industrious and intelligent.

Although alcoholic beverages were used quite sparingly by his parents, the mother when *enciente* was in the habit of using them several times daily until after confinement. But just before becoming pregnant with the subject of these remarks, her eighth child, a strong temperance movement was instituted in the section of country in which his parents resided. His father being a minister, was naturally expected to take the lead in the good cause. Both parents taking an active part in the endeavor to suppress the use of alcoholic liquors, of course forbade the accustomed use of the beverage even in the delicate situation in which she had now become. During the lat-

ter months of gestation a great conflict ensued between the appetite for the beverage to which she had been accustomed, and the moral restraint to which she had subjected herself. The appetite growing stronger as gestation advanced, was a source of great discomfort; but the moral restraint and the power of the will held the entire mastery.

The effect upon the offspring was specific. The boy when quite small was often the object of observation. Quite to the surprise of his parents he manifested the same peculiarities of appetite and sentiment that possessed his mother during her stage of gestation with him. If there was any spirituous liquor any where near him, he would be frantic to get a drink of it, but strange as it may seem, would appear glad when it was placed beyond his reach.

This gentleman reports, and his veracity is perfectly reliable, that from his earliest recollection he has always had a strong appetite and desire for alcoholic liquors, but is cognizant of the accompanying automatic action of the will, which enables him to abstain from them. He says that he has a conscious sensation within his own mind, that the desire for these liquors is coupled in the mind's action with the will power that enables him to abstain from their use. In short, he has a duality in the operations of his mind transmitted from his mother, and exactly as she had them.

Art V.—THE MANAGEMENT OF DELIRIUM.

By J. Milner Fothergill, M.D.

From The Practitioner.

THERE are few more complex problems put before the practitioner than how to conduct the treatment of a case of delirium. Not rarely the problem is brought somewhat abruptly before his notice. Whether so suddenly presented to him, or its advent has been foreseen for some days, it is always accompanied by points of difficulty. In this respect, each

case differs somewhat from every other case, and there are peculiarities in each and every one. In order, then, to meet such cases with a fair attention to their needs, the first thing requisite is a pretty clear comprehension of delirium as a whole. The next thing is to supplement this general knowledge by attention to the exigencies of each individual case. The latter, it is obvious, is a matter which must rest on the knowledge and good sense of the practitioner, and his allies, the nurse and the friends of the patient. Little can be done here. The first, however, is a matter which may well engage our attention.

Delirium manifests itself under various circumstances. It is not by any means a matter of indifference what these circumstances are, as giving indications for treatment. Delirium may be induced by sthenic conditions, as when it is causally associated with meningitis. It may mark exhaustion of the cerebral cells, together with general adynamy, as in delirium tremens. It is obvious that the treatment of delirium under these different circumstances must be varied according to the indications. Then, again, delirium is very common in the pyretic affections of childhood, not only in the more advanced stages, but in the commencement of the ailment. The younger the child, and the more emotional its temperament, the more readily are the evidences of disturbed cerebral action evoked. There is, however, as much difference betwixt the delirium of the commencement of a febrile attack in a child and that of advanced typhoid conditions in the adult, as there is betwixt the delirium of meningitis and delirium tremens. When delirium comes on in the latter stages of continued fever, it is usually accompanied by other evidences of an impure condition of the blood, as subsultus tendinum and muscular prostration. When it shows itself in the exanthemata, there is not usually such a waste-laden condition of blood as to occasion those marked evidences of its effects upon the cerebral centres, and the delirium is probably associated with the effects of the fever poison.

We may now proceed to consider the changes which are the physical side of the question. In delirium, there is a modification of the functional activity of the cerebral cells. In meningitis there is an active and violent condition of delirium,

together with strong muscular movements. There would seem to be an exalted condition of the cells of the gray matter to such an extent as to disturb the equilibrium ordinarily existing, and so to institute an escape from the control of the will. In delirium tremens, the condition is more commonly that of exhaustion of the cerebral cells from the sustained alcoholic stimulation to which they have been subjected. There is that excitability and irritability which are the precursors of exhaustion in nerve matter. In the case of children, a slight rise of temperature is commonly sufficient to institute an irregular action in the cerebral cells, which becomes manifest in incoherence and rambling. The delirium of the typhoid condition, and especially when associated with specific fever, is the result of excited cerebral action, leading to exhaustion, combined with an impure state of the blood. In the acute delirium of the exanthemata, there would appear to be a certain amount of cerebral hyperæmia, together with the effect of the poison upon the cells of the gray matter.

In all these cases, and doubtless equally in the other less common conditions which furnish delirium, there is an irregular or exalted action of certain cerebral centres, together with a diminution of the controlling forces ordinarily in action. That balance and harmony which normally exists in all, to a greater or less extent, is disturbed by certain physical conditions, and then irregular cerebral action results. In children, where there is much more mobility than is normal in adults, not only is delirium readily induced, but irregular muscular movements, or convulsions, are common, indicating disturbance in the motor centres. In adults, too, there is a wide difference in their respective proneness to delirium.

The emotional mobility and ready excitability of one person, indicating an unstable equilibrium, contrast with the well-controlled cerebral action in others where reason is rarely and but with difficulty unseated. Much slighter causes of disturbance will excite the delirium in the first-named; great and sustained disturbing action is necessary to induce it in the latter. When, however, the brain is kept for some time at a high temperature, and fed by impure blood, its excitability is much increased, and its equilibrium is very apt to be overthrown.

These last are the conditions under which we find delirium usually induced; and it is with delirium so associated that the present consideration chiefly deals.

For the proper comprehension of the measures required for the management of delirious patients, some review of delirium from its psychological side is clearly indicated. There has been little scientific attention paid to delirium, and there has little attempt been made to comprehend and unravel the workings of the mind in this state. It is common enough for medical men to have delirium when seized with fever, but unfortunately a very large proportion die. Very few care to analyze their sensations or their remembrances of a delirious past, and consequently there is but little in our literature which tells us of the attitude of delirium from the patients' point of view. It is chiefly from the stand-point of the careful clinical observer that we can look at delirium. Experience soon tells us that delirium is not what unprofessional people imagine—namely, an upheaval of hidden thoughts—of thoughts associated with fears and dreads, which then manifest themselves openly, escaping from the weakened control of the ruling centres which ordinarily restrain them from outwardly indicating themselves. All that is carefully hidden does not ordinarily escape in delirious raving, though the more such matter obtrudes itself in the consciousness in health, the more likely it is to reveal itself when the will is laid in abeyance by disease. The evil conscience may keep the prospect of delirium and its revelations before the possessor of a guilty memory; and it is no great evil if it does so. But the material of raving thought is chiefly the objects upon which the mind ordinarily dwells. The bricklayer's mind wanders amidst bricks; the medical man commonly wishes to visit his patients; the soldier's thoughts turn to the grim matters belonging to his avocation. But maidens do not mutter their lovers' names nor men their *liaisons* in preference to anything else. Delirium is but a modification of our ordinary thought; frequently it is little more than incoherent thought. At other times the imaginative centres may be active, and, instead of a day-dream, the fancies are expressed in words. More frequently, however, delirium is immediately excited by disturbed or imperfect im-

pressions coming in from the periphery, or from some idea occasioned by what is seen or heard. The unstable brain is easily perturbed; and if the eye sees but imperfectly, or does not recognize readily the object seen, then a flood of erroneous ideas is inaugurated. If the eye falls upon unwonted objects or an unfamiliar aspect, then a direction is at once given to the wandering thought.

Nothing is more common in a delirious patient than a fixed determination to escape from his bed and from the apartment which he occupies. Again and again have fever patients to be strapped to their bed, in order to prevent them from injuring themselves in attempts to get away. No amount of watchfulness, which is feasible, can be given to their unintermitting aim of escape. But why do they want to get away? Why does the delirious patient in private practice give so much trouble, and require incessant watching? Because, like the insane patient, he wishes to get home!

When the brain is wandering, and reason no longer rules, the prevailing desire is to get away to familiar scenes and wonted surroundings. The mind craves for its usual associations of ideas as to locality and neighbors. Consequently, when the delirious patient wakens up in the fever-ward, there is nothing on which his eye may rest with which it is familiar, or which helps the wandering brain to collect its erratic thoughts. The ruling idea is to get home; and a very natural idea it is. Every sick person craves ardently to be at home amidst relatives and friends; and in delirium the craving commonly takes the direction of an attempt to get away home by immediate escape from the room occupied at the time. It is no matter for surprise that, under such circumstances, the delirious patient will make a desperate resistance to the attempts to restrain him. Not only his sensations, but his ideas, that it is but proper that he should be at home when ill, will urge him to the utmost resistance, and very often to resort to active measures in order to overcome an opposition which seems to him as unreasonable and unjust as it is uncalled for. The feeling prompting the patient is a very proper one; and he is conscious enough that what he feels to be right is upon his side. Consequently, his struggles only cease with exhaustion,

and a wailing cry indicates that the consciousness of powerlessness is as painful as the bitterness of death. When that sound falls upon the ears of near relatives, it adds no little to the painfulness of their position, and heightens a scene already tragic! There is nothing wrong, improper, or perverse, about this persistence in the desire to escape from a strange place, and from those who so cruelly restrain a natural wish. Can it be any matter for surprise that, under such circumstances, a patient will evince a keen dislike as well as distrust of those whom, from his point of view, he has so little reason to love? Neither can it occasion surprise if the desire to leave his room and to get away is unwearying and persistent. The natural desire is sustained by a consciousness that there is nothing but what is proper and creditable in the wish to get away. The room is a hateful prison, and the attendants are heartless jailers, who restrain the sick man from getting away to his home, where he feels it but right that he should be.

In exactly the same way do erroneous impressions arise in a delirious patient's mind even when lying in a wonted chamber, if the aspect of that chamber be altered until the unsteady eye and wandering brain no longer recognize it on awaking. So familiar must all experienced practitioners be with this, that it is somewhat surprising more allusion is not made in our text-books to the necessity for keeping a fever patient in his own room, and also of retaining as far as possible the aspect of that room unchanged. A personal experience of delirium and its sensations, together with an experience of a near relative in delirium, compel me to write very distinctly about the desirableness of retaining the wonted associations of a sick-room, when its inmate is delirious. To the painful experiences of the craving to get home, experienced during delirium, are added the no less painful memories of watching a relative praying to be permitted to return home, and of feeling the powerlessness to accede to the request or to dispel the erroneous impression. After such experience, a strong wish exists to impress upon the minds of others the misery that may ensue from altering the arrangements to meet the necessities of a sick-room; to demonstrate what the drawbacks are to such changes; that in spite of the obvious advantages of the change it is undesirable. The

impression made upon the mind of the patient that he is imprisoned by hostile attendants is not only exquisitely painful, but it exercises an evil effect upon the progress of the case. A feeling of suspicion and dislike is built up which interferes much with the general understanding which should always exist betwixt patients and their attendants.

It is obvious, then, that if opposition must be offered to a patient's wishes, it should be so conducted as to create no unnecessary impression of restraint, and that if the desires can be combated by cajolement, it is infinitely better than overt opposition. If the mental attitude of the delirious patient were but better understood, the attendants would be much encouraged to persevere in their attempts to restrain the patient by arguments, and appeals to what is left of reason; and their arguments would be all the more effective if they were directed to the erroneous impressions of the patient, and were calculated to correct the aberrations. If instead of holding the idea of wild, chaotic, objectiveless, mental wandering, the attendants but thoroughly realized the patient's objects and wishes, how tolerant they would become—how patient, in attempting to correct the patient's delusions and in restraining them if necessary. It would substitute an intelligent tolerance for a feeling of simple necessity for opposition to the patient's wishes. Amidst the advances of modern medicine, a better comprehension of the nature of delirium is very desirable.

Copland, in speaking of the treatment of the delirium of continued fever, states that Hildenbrand and Naumann advised that attempts should be made to "rouse the patient's moral sentiments and affections, and to disperse his fugitive and chaotic ideas by recalling former associations and objects of affection or ambition;" and in one case he found such attempt successful. In other words, it is desirable to dispel the erroneous impressions, not so much by combating them as by trying to substitute other thoughts and other ideas in the place of the diseased ones, and to occupy the foreground of the consciousness by normal associations of ideas. This is more desirable in delirious patients nursed at home, than among patients in a hospital where coercion is simply necessitated; as a sufficient staff to attend to every patient in such place would be imprac

ticable on account of its cost. In the case of patients at home, however, matters are different, and such plan should always be aimed at. There is something very staggering to the delirious patient in the conception that his near relatives and friends, those indeed upon whom he previously thought he could most rely, are prepared to offer the most uncompromising resistance to those wishes, which appear to himself well founded and perfectly proper. There is no difficulty in seeing how very painful such impression must be to a mind wandering, and yet conscious of its bodily feebleness, and how desirable it is that such impression be avoided.

Having said so much for the psychical treatment of delirium, the question of its physical treatment can be entertained. In order to make this lucid, it may be as well to eliminate two of the various forms of delirium from our inquiry by dismissing them briefly. As to the delirium which marks the onset of febrile conditions in children, it is a mere symptomatic affair, scarcely calling for treatment. Delirium tremens is a complex affair, and to be treated by the indications of each case. If the pulse be full, bounding, and incompressible, a good dose of opium with antimony is indicated in order to procure rest. But if the pulse be small, compressible, and very quick, when sleep is kept off by that irritability which is so associated with commencing exhaustion in nerve structures, full doses of opium are dangerous. The sedative effect of opium upon the nerve centres under these circumstances is such, that death has not rarely followed the administration of a medicinal dose of opium or morphia. It is possible that death here results from the effect of the opium upon the ganglia of the heart. Mr. Jones, of Jersey, gave tincture of digitalis in half-ounce doses for such delirium with good effect. Probably in such cases the combination of digitalis with bromide of potassium and some of the vegetable narcotics is indicated.

In the consideration of the delirium associated with sustained pyretic conditions from a therapeutic point of view, it is of the utmost importance to carefully weigh the different factors of the case, and to be guided accordingly. If there be considerable vascular excitement and heat of head, then opiates are inadmissible. Chloral hydrate in fifteen-grain doses, re-

peated at hourly intervals till a drachm be given, is a much more suitable agent, as it exercises a very decided effect upon the vascular system as well as upon the nerve centres; or bromide of potassium may be exhibited with advantage. One point must be remembered, and it is this: in the typhoid state when the tongue is covered with a dark fur of dead epithelium cells, a similar layer of effete cells lines the intestinal canal, and medicines given by the mouth are of little avail, because they are not absorbed. Subcutaneous injections of chloral hydrate of a strength of not more than ten grains to the ounce—in order not to cause severe local disturbance, as stronger solutions are prone to do—will often prove of decided service. The application of cold to the head by means of an india-rubber water pillow, and if necessary, a bladderful of cold water placed on the top of the head, is a very useful measure. There is no doubt but that the temperature has much to do with the oncome of delirium, and the intelligence is rarely if ever unaffected when high temperatures are reached. Draughts of cold fluids are also serviceable. The cold pack will restore the intelligence readily, even in severe delirium, when it lowers the temperature markedly; and the rise of the temperature to its previous height is accompanied by a return of the delirium. The lowering of the temperature is an efficient means of affecting the abnormal action of the cerebral centres.

Such are the measures to be resorted to in delirium associated with high temperatures.

At other times a form of delirium is met with after the acute pyretic condition is over. It seems rather a form of cerebral exhaustion than a form of active delirium. Dr. Stokes enumerates three conditions which call for the use of opium in fever: (1), where there is persistent watchfulness; (2), where an inflammatory condition of the brain has existed and been subdued, but delirium or other nervous symptoms still remain; (3), where an excited state of the sensorium exists without heat of scalp or remarkable throbbing of the arteries of the head. To these Copland adds the condition of there being free discharges or unrestrained evacuations.

The use of opium is clearly indicated in all these conditions except the first—when it appears along with much vascular

excitement. Here it would be much better to combine the opium with chloral, or to use chloral instead. At the time when Stokes wrote these directions, chloral was undreamt of, and so could not be alluded to.

Well advised and judicious therapeutic measures will greatly aid the moral treatment of delirium.

Art. VI.—THE AUTOMATISM OF MEMORY AND ASSOCIATION IN PATHOLOGICAL SOMNAMBULISM.

By Dr. E. Mesnet.

Translated from L'Union Medicale, July 21 and 23, 1874, by F. J. Huse, M. D.

THE disorders which we propose to study in this paper appertain to the neuroses which Cerise has designated extraordinary. They are remarkable in reality from their peculiar mode of appearance, and the singularity of the phenomena which accompany them. Most frequently we see them appear in the midst of hysterical disturbances and functional perversions of the nervous system. They manifest themselves by crises, or rather by attacks of short duration, which render their study difficult. The uncertainty of the organic conditions which produce them also contributes to the difficulty, and we therefore find doubters and even those who deny their existence. But observation is sometimes able to establish the relation of cause and effect in a manner so evident that it gives the facts the authority of science, which so many times had been opposed to them. In the present instance we need fear no contradiction, as the psychic disturbances which we describe and discuss, had a material point of departure, and commenced at the time when the patient was still suffering from a severe and serious injury of the brain.

F——, 27 years of age, sergeant in the army of Africa, re-

ceived, in one of the battles preceding Sedan, a bullet wound which fractured the left parietal bone. The ball, fired obliquely, made a wound eight or ten centimetres in length, parallel to and about two centimetres below the temporal suture. At the time he received the wound, F—— had still enough power to overturn with a bayonet thrust the Prussian soldier who attacked him, but almost at that instant his right arm became paralyzed, and he was obliged to abandon his weapon and make his escape from the conflagration and the storm of balls which rained down on the village of Bazeilles. He was able to proceed about two hundred metres, when his right leg also became paralyzed, and he lost all consciousness. It was only after the lapse of three weeks that he recovered his senses, when he found himself in Mayence, whither he had been transported by a Prussian ambulance.

At this period the right hemiplegia was complete, the loss of motion absolute. Six months later he was taken to France, and was an inmate of various military hospitals in Paris, the paralysis continuing about a year. Nevertheless, he was finally so fortunate as to recover from this, and to-day there remains only a slight feebleness of the right side, scarcely perceptible to the patient, and appreciable only by the aid of the dynamometer.

From a period when the patient was still at Mayence, some three or four months after his wound was received, he has presented certain disorders of intelligence, manifesting themselves by periodic attacks, characterized especially by partial obscuration of the organs of sense, and by a cerebral activity differing from that of the waking state. Since this epoch, even after the cure of the hemiplegia, these attacks have not ceased to reappear, always in the same manner, differing only in the length of time between them, the average being from fifteen to thirty days, and their duration averaging from fifteen to thirty hours.

The nervous disorders which we propose to study in the case before us, have undeniably a material origin of departure—a fracture of the parietal, with destruction of bone to an extent readily recognizable at the present time, and by reason of that fracture a lesion of the brain in its left hemisphere, as is shown by the hemiplegia of the whole right half of the body for a

period of more than a year. What is this lesion? Apparently a local encephalitis, or an abscess in the nervous substance, since the external wound and the paralysis disappeared at about the same time, after having existed together for a year, and permitted the functions of sensibility and movement, so long abolished in the right half of the body, to recover their normal equilibrium. What is it that still remains at the present time? A simple functional disorder, appearing with the material lesion of the brain, and persisting even after all the functions of the life of relation have been re-established.

For four years the life of F—— has presented two essentially distinct phases—the one normal, the other pathological.

In his ordinary condition, F—— possesses sufficient intelligence to provide for his needs and gain a livelihood. He has been clerk in various houses, a singer in a *cafe* in the Champs Elysees, and in his discharge of the duties of sergeant, when he was with his regiment, he developed certain aptitudes which attracted the attention of his superiors. Since he has been under my charge in the hospital, he has shown himself serviceable, kind to the other patients, and his conduct has called for no reproof.

His general health leaves nothing to be desired; all his functions are regular, although he bears on the buccal mucous membrane, and on his limbs, a few traces of secondary syphilis which date back five or six months.

The special point of interest in this patient is in the pathological phase which we are about to consider, and in the disorder which, all at once, supervenes in the exercise of his intellectual faculties. The transition from the normal to the diseased condition is instantaneous, and made in a perfectly insensible manner. His senses shut themselves up from all excitations from without, the external world ceases to exist in his consciousness, he lives a purely personal life, he only acts from special excitations, or from the automatic action of his brain. Although he is utterly unconscious of his surroundings, and his personality is completely isolated from all about him, we see him go, come and act, as if in full possession of all his faculties, and in such a way that no one not previously informed as to his condition, meeting him in a promenade or in a pass-

age, would suspect the singular phenomena presented by this patient.

His gait is easy, his attitude calm, his physiognomy peaceful; his eyes are opened widely, the pupils dilated, the forehead and brows contracted, with an incessant movement of nystagmus, indicating a disordered state in the cerebrum, and a continual mumbling or muttering. When he walks in a place to which he is accustomed, and the local dispositions of which he knows, he moves with all the freedom of manner of his ordinary condition; but if we put him in a place unknown to him, or put obstacles in his way, barring his passage, he strikes gently against each object, passes his hands over it, examining its contour, and turns easily aside. He offers no resistance to any movements which may be impressed upon him; no matter whether we attempt to change his direction, or to quicken or retard his pace, he allows himself to be directed like a mere automaton, and continues his movement in the way we choose to direct him.

During all the course of these crises, the instinctive functions and the appetites are met as in the state of health; he eats, drinks, smokes, dresses himself, walks out, undresses himself in the evening, and retires to bed at his usual hours. *Under what influence are all these acts accomplished? Are they provoked by real wants, by organic sensations, or rather are they not automatic, the simple result of the habits in the normal condition continued in this dormant state?* I have been disposed to accept this last interpretation, because every time I have seen him eat, he ate voraciously and without discernment, scarcely chewing his food at all, devouring all that was set before him, without showing any satiety, the certain indication of satisfied needs. He drank in the same manner all that was offered him, *vin ordinaire*, wine of quinine, water, assafœtida, without manifesting any agreeable, painful, or indifferent sensation whatever.

The examination of the general sensibility and of the special sensibility of the organs of sense, showed a profound disturbance. The general sensibility of the skin and of the muscles is absolutely extinct; we may, with impunity, prick the skin in different parts of the body, in the hands, arms. feet, legs,

chest or the face. The patient also feels no sensation if, taking a pin or an awl, we penetrate the skin and force it deeply into the muscular tissues. The same is the case with experiments made with a powerful electric battery; the patient is insensible to the most powerful currents applied to the arms, the chest or the face, although the electric excitation causes the strongest contraction of the muscles.

The general sensibility is therefore entirely destroyed, while the electro-muscular excitability is preserved.

The *hearing* is completely lost. He receives no impression from noises made in his vicinity. The auditory meatus in all its extent, is insensible to tickling or pricking.

The sense of *taste* is extinct. He drinks indifferently water, wine, vinegar, or assafœtida. The mucous membrane of the tongue and mouth are insensible to pain.

Smell.—No odor, good or bad, is perceived by the patient, neither vinegar nor assafœtida. The mucous membrane of the nasal passages is insensible throughout its whole extent, so that foreign bodies may be introduced into the nasal fossa as far as the velum palati without causing tickling or sneezing.

Sight.—The sight, like the other senses, is closed to external impressions, but it may be in a less complete manner. The patient has seemed on many occasions to be sensible to the effects of brilliant objects; but the sensations which they produce in him give him only vague and confused notions, so that he is obliged to call the sense of touch to his aid to enable him to understand their form, volume, etc.

Tact.—Of all the senses, that of touch is the only one which persists and maintains the connection of the patient with the external world. The delicacy with which he passes his hands over objects, the use which he makes of touch on a thousand occasions under our observation, indicate a fineness and subtilty of this sense, excelling the average of its exercise in normal healthy conditions.

The isolation in which F—— is placed, is therefore the result of a considerable disorder interfering with the exercise of his nervous functions. F—— is a patient in whom the cerebral innervation loses temporarily its attributes of general and special sensibility, which put the man in constant relation

with external affairs. He is suffering from a functional disorder which presents all the characters of the neuroses, and which, although extremely singular and exceptional in its manifestations, is not altogether without precedent in the history of diseases of the nervous system.

I was once permitted to observe for a long series of months, a case which offered a very great analogy with the one before us, the account of which was published in detail in the *Archives de Medicine*, for 1860.

Some years later Dr. Motet published in the *Annales Medico-Psychologiques*, the case of a young girl who presented, among other disorders of the nervous system, a certain number of symptoms more or less like those we are about to describe, and of which I was myself a witness.

The *concours* opened at the institute in 1855, by the section of moral and political sciences, *on the question of sleep in a physiological and psychological point of view*, became the occasion of the remarkable works of MM. Albert Lemoine and Macario, who were thus led to treat of many of the points that now call our attention.

Some years later, about 1861, M. Alfred Maury published his book, *Du Sommeil et des Reves*, in which we find some very interesting facts bearing on this question, etc.

Among all the neuropathies, those which affect the functions of the cerebral innervation are invariably the most striking, by the singularity of their expressions. These are the ones that open the field of the marvelous, and they have served in all times and among all peoples, to play on the simplicity of the credulous. It is easy, in a superficial study or in an examination made with preconceived ideas, to pass by the truth, and by neglecting certain details, and exaggerating others, to arrive at fanciful results in which the marvelous and the supernatural are brought into the foreground, at a time when the entire scene belongs to the patient. For the purpose of avoiding error, I consented to submit the patient, whom I had under my care, to the examination and observation of my colleagues at the hospital of Saint Antoine, while at the same time I gained information from Dr. Legroux, who had confided him to me, and availed myself of the experience of M.

Alfred Maury, who was willing to enlighten me with his judicious counsels.

The nervous disorder which F—— presents, only manifests itself in crises or paroxysms of brief duration, relatively with the intervening period. The first of these attacks goes as far back as the early part of 1871, when F—— was still confined in Germany, and hemiplegic in the right side. At this period the crises repeated themselves at shorter intervals, and he continued in this condition as long as the wound in the skull remained open, or a trifle over a year; from this time onward the attacks were retarded, and the intermediate stage, which at the first was of from five to six days, became finally of from fifteen to thirty days. This periodicity was preserved for about two years, unless some fault of diet, or some excess of the patient stepped in to hasten the return. They always, however, resembled each other, and were stamped with the seal of an unconscious activity. The onset of the paroxysm is preceded by an uneasiness and a heaviness about the forehead, that the patient compares with the pressure of an iron band; in its termination it is the same, since, for many hours afterwards, he continues to complain of heaviness in his head, and numbness. The transition from health to illness is accomplished with rapidity, in a few minutes, insensibly, without convulsions, without cry; *he changes from one to the other without experiencing those fading tints of light and reason which we find at the hour when sleep approaches; and he who is conscious, responsible and in full control of himself, an instant later is only a blind mechanism, an automaton, obeying the unconscious activity of his brain.* He moves with an appearance of freedom which he does not really possess; he seems to exercise his will, and yet he has only an unconscious volition which is powerless to remove the slightest obstacle opposed to his movements.

All the actions in which he engages, all the activity which he exhibits in his attack, are merely the repetition of his former habits. It is more difficult to understand, or even to imagine, and yet he has a strange habit, which, as we shall elaborate further on, has exhibited itself from the time of the first paroxysm, when he was still a soldier, and which each

time reappears in the same conditions, and seems the special purpose of his abnormal activity: *it is the tendency to steal, or rather to make away with everything which comes in his way, and which he imperfectly conceals wherever he may chance to be.* This desire for subtracting articles and concealing them, is such a predominant matter with this patient, that having appeared in the first attack, it has not failed to show itself in every subsequent accession. He is satisfied with anything, even to the most trifling articles; and if he finds nothing on his neighbor's table, he hides with all the appearance of secrecy, although a numerous company may be surrounding and watching him, the various objects belonging to himself, his watch, knife, pocket-book, etc.

The entire duration of the attack is a phase of his existence of which he has no recollection upon awaking; the forgetfulness is so complete, that he expresses the greatest surprise when told of his actions; he has no notion, even the most indistinct, of the time, place, motion, investigations of which he has been the object, nor of the different persons who have attended him.

The separation between the two phases of his life, health and illness, is absolute.

We may come to the psychological study of this individual through the interpretation of the facts that present themselves during the attack, never losing sight of the details from daily observation, which may be found in another portion of this article.

The general sensibility is, as we have said, completely extinguished. The muscular sensibility is preserved. Hearing, smell, and taste, are sealed against any impressions from without. Sight yields only vague ideas, without taking cognizance. The sense of touch persists, and seems to acquire delicacy and an exaggerated impressibility.

And it is in the midst of this extensive nervous disturbance that we have to determine the value and signification of incidents which we shall shortly describe.

The activity of F—— is nearly the same during his attack as in his normal condition, with the exception that motion is less rapid; he moves about with open eyes and a fixed gaze;

if he is directed against an obstruction, he strikes against it slightly and turns to one side; whether it may be a tree, a chair, a bench, a man, or a woman, it is nothing more to him than an obstacle, the character of which he does not recognize. The expression of his countenance is generally impassive, immovable, and yet at times it reflects the ideas which spontaneously present themselves in his mind, or which the sense of touch awakens in his memory. His expression, his gestures, his mimicry, which have ceased to have any relation with his surroundings, are exclusively engaged in the functions of his personality, or still better, of his memory. For example, we witnessed the following scene:

He was promenading in the garden, under a grove of trees, when some one put back into his hand the cane which he had let fall a few moments previously. He felt of it, turned his hand several times around the curved handle of the cane, became attentive, seemed to listen, and suddenly cried out "hurry!" then, "there they are! there are at least twenty of them, to the two of us! we shall get the better of them!" and then, carrying his hand behind his back as if to get a cartridge, he went through the movements of loading his musket, crouched at full length in the grass, concealing his head behind a tree, in the posture of a sharpshooter, and following with his gun at his shoulder, all the movements of the enemy whom he seemed to see close at hand. This scene often repeated in detail during the course of the observations, has seemed to each of us the most complete expression of an hallucination called up by an illusion of touch, which, giving to a cane the properties of a gun, awakened in this person remembrances of his last campaign, and reproduced the struggle in which he was so grievously wounded. I have tried, during the attack occurring fifteen days later, to search for the confirmation of this hypothesis, and I do not believe that it is possible to throw any doubt upon this interpretation, since I have found that the patient having been again placed in the same conditions, the same scene is reproduced upon the encounter with the same object. It has thus been possible for me to direct the activity of my patient in accordance with a train of ideas which I could call up, by playing upon his tactile sensibility, at a time when

none of his other senses afforded me any communication with him.

All the actions and expressions of F—— are either the repetition of what he does every day, or are brought up by the impressions objects make upon his touch. It is sufficient to observe this patient during a few hours, in order to produce a decided opinion regarding this subject. By following him in his wanderings about the hospital of Saint Antoine, M. Maury and I have witnessed a thousand incidents coming up by chance, but all highly interesting from a psychological point of view.

We were once at the end of a corridor, near a door that was locked; F—— passed his hands over this door, found the knob, grasped it, and attempted to open it; failing to accomplish this, he sought for the key-hole, then for the key, which however, was not there; then, passing his fingers over the screws which secured the lock, he endeavored to seize them and turn them for the purpose of detaching the lock. *This entire series of actions bears witness to an effort of his mind connected with the object before him.* He was on the point of leaving the door and turning towards another room, when I held up before his eyes a bunch of seven or eight keys; he did not see them; I jingled them loudly at his ear; he did not notice them; placing them in his hand, he immediately took hold of them, and tried them one by one in the key-hole, without finding the single one which could fit; he then left the place, and went into one of the wards, taking in his passage various articles with which he filled his pockets; at length he came to a little table used for the records of the ward.

He passed his hands over the table but it was empty; in feeling of it, however, he came across the handle of a drawer; opening it, *he took up a pen, and all at once this pen suggested to him the idea of writing;* for at that moment he began to ransack the drawer, taking out and placing on the table several sheets of paper, and also an inkstand. He then sat down and commenced a letter, in which he recommended himself to his commanding officer for his good conduct and bravery, and made application for the military medal.

This letter was written with many mistakes in it, but these

were identical as regards expression and orthography with all that we have seen him make in his healthy state. While the patient was writing, he aided us in an experiment that encouraged us to immediately examine in what degree the sense of sight assisted in the performance of this action. The facility with which he traced his letters, and followed the lines upon the paper, left no doubt concerning the exercise of vision upon the writing; but, in order to make the proof satisfactory, we have several times interposed a thick plate of sheet iron, between his hands and his eyes when he was writing; and although all the visual rays were intercepted, he did not immediately break off the line he had begun; he still continued to trace a few words written in an almost illegible manner, with the letters entangled in each other; then finally he stopped without manifesting either discontent nor impatience. The obstacle removed, he finished the uncompleted line, and began another.

The sense of sight was therefore in full activity, and essential to the written expression of the patient.

As further evidence, we are able to cite a second test not less demonstrative; for while the patient was writing, we substituted water in place of the ink which he was using. The first time he dipped his pen, there still remained a slight tinge that was sufficient to render the writing legible; but the second time, the pen which held only water, traced transitory, frustrating characters as he at once perceived. He stopped, tried the tip of his pen, rubbed it on his coat-sleeve, and attempted to resume his writing—the same results—then a fresh examination of his pen, which he scrutinizes more carefully than before; again disappointed—and yet this patient, confused and distracted from his employment by our whim, never had the idea for an instant that the source of trouble was in the inkstand. His mind was incapable of spontaneity, and his sight, directed upon the paper and the pen which he held in his hand, remained very imperfect, inspecting the inkstand, with which he was not in contact. This second observation confirms the first; *each demonstrates that sight really existed; but this fact seemed to be evident, that the field of vision was exclusively restricted to a circle relating most intimately with the*

individuality of the patient; that the sense of sight was only roused at the instance of touch; and that its exercise remained limited to those objects alone with which it was actually connected by the touch. Other observations subsequently came to the support of this opinion; and before passing to a fresh series of facts, I wish to notice one very curious hallucination which we were so fortunate as to observe while F—— was engaged in writing.

He had taken several sheets of paper to write upon, and there were nearly a dozen piled up before him; he was engaged upon the first page, when the thought occurred to us to snatch it quickly away; his pen, however, continued to write upon the second sheet, the same as if he had not perceived the subtraction that we had effected; and he completed his sentence without interruption, and without exhibiting any other expression than a slight movement of surprise. He had written ten words on the second sheet, when we removed it as rapidly as the first, and he terminated on the third sheet the line commenced on the preceding, continuing from the exact point where his pen was placed. We took away successively, and in the same manner, the third sheet, then the fourth, and arrived at the fifth; he signed his name at the bottom of the page, when everything that he had written had disappeared with the preceding sheets. We saw him then turn his eyes towards the top of this blank page, read over all that he had written, giving a movement of the lips to each word; while at various times, he made with his pen, in different places on this blank page, here a comma, there an *e*, at another place a *t*, following out carefully the orthography of each word, and correcting them to the best of his ability; each one of these corrections corresponding to an incomplete word, which we found at the same height and the same distance on the sheets of which we ourselves had possession.

Regarding the signification of this remarkable action, it seems to us that its solution exists *in a hallucinatory state that creates the ideal-image;* and gives to the mind or the memory, such a power of reflecting this ideal-image towards the senses, as these entering into exercise would give either to the mind or the remembrance, an external reality. This hal

lucination is of such a nature as those we meet with in sleep, in dreams, and in cerebral neuroses. F—— read over again in his memory the letter that he had written; his eyes fixed upon the blank page, giving him a false sensation of lines which did not exist, just as in one of the preceding observations, he saw Prussian soldiers before him, whose movements he watched intently, that he might pick some of them off at the seasonable moment.

His letter terminated, F—— quitted the table, and putting himself again in motion, passed through another long ward of patients, taking indiscriminately every article that came within his reach, and concealing them afterwards under the quilt, under a mattress, under a chair-cover, and under a pile of sheets. Arrived in the garden, he took from his pocket a book of cigarette papers, opened it, and detached a leaf from it; then took out his tobacco and rolled a cigarette with the dexterity of one who is accustomed to this proceeding. He searched for his match-box, lighted his cigarette with a match, which, falling still burning upon the ground, he extinguished by placing his foot upon it; then smoked his cigarette while strolling back and forth to the entire extent of the garden, without any of these actions presenting the slightest deviation in their manner from the ordinary method. Everything that he did, was the faithful reproduction of his ordinary round of life.

This first cigarette terminated, he prepared to smoke another, when we stepped up and began to interpose obstacles. He held a fresh sheet of paper in his hand, ready to receive the tobacco, and he searched vainly in his pocket for his tobacco, as we had filched it. He searched for it in another pocket, going through all his clothes until he came back to look for it in the first pocket, when his face expressed surprise. I offered him his tobacco-pouch, but he did not perceive it; I held it near his eyes, yet he still did not perceive it; even when I shook it just in front of his nose, he did not notice it. But when I placed it in contact with his hand, he seized it and completed his cigarette directly. Just as he was about to light the cigarettte with one of his matches, I blew it out and offered him instead a lighted match which I held in my own hand;

he did not perceive it; I brought it so close to his eyes as to singe a few lashes, yet he still did not perceive it, neither did he make the slightest motion of blinking. He lighted another match, when I blew it out and offered him one of mine, with the same indifference resulting on his part as before. I brought it in contact with the cigarette which he was holding in his mouth, but even when I burned the tobacco of his cigarette, he did not notice it, nor make any movement of aspiration. This experiment, so remarkable for its simplicity and for its results, goes to confirm the preceding; both show us *that the patient sees certain objects and does not perceive others; that the sense of sight receives impressions from all the objects in personal relation with himself through the touch, and does not receive impressions, on the contrary, from things external to him; he perceives his own match, but does not perceive mine.* I have at different times, during later paroxysms, repeated the same experiment and obtained the same results; the patient remained entirely indifferent; his eye, dull and fixed, exhibited neither blinking nor pupillary contraction.

During more than two hours M. Maury and I followed this patient, observing his movements and gait, and watching his designs; we had traversed the greater portion of the hospital with him, and at length we found ourselves in the vicinity of the kitchen. I directed him toward the private apartment of the nurse, where he had never been, and, guiding himself with his hands, he made the circuit of the room, touching everything. He perceived a cupboard, opened it, and touching against some bottles, took them out and examined them; finding that they contained wine, he drank of it.

Coming before a small desk, his sight was impressed by some bright objects on a shelf; he took them up and, after examining them, put them all one after the other into his pockets. I threw some pens upon the desk while he was going over it with his hands, and his fingers encountering these, they gave him, as I had hoped, a fresh impulse for writing.

Scarcely had he touched them, when he drew up a chair and began a letter to one of his friends. He said to her: "It is necessary to change the hour of meeting, as he sings this evening in the cafe in the Champs Elysees, and will not return

home before eleven o'clock." We allowed him to finish this letter without any interruption. He put it in an envelope, addressed it to Mlle. X——, and added: "*To be sent by a commissionaire.*" This special indication evidently signified that this letter had a particular importance to her, and he proposed that it should reach her without delay. He put it in his pocket and arose, but at the same time, without any precaution or sleight of hand, I possessed myself of this letter upon which he attached so much importance. Although my hand, in reaching into his pocket, was intentionally thrust against his breast and arm, he failed to notice the subtraction which I effected. The words of the letter made me think that our patient was in the midst of a chain of ideas which we much desired to see controlling him, but which it was impossible for us to suggest to him. He had in his previous attack sang several ballads from his repertoire, at a time when the remembrance of his former profession of singing had spontaneously crossed his mind, and therefore we were waiting for some happy chance to again inspire him into singing, for we had, as we have said, no means of starting him in this direction.

He only took a few steps in the courtyard, when he began to hum some airs which seemed familiar to him; after which he proceeded to the ward where he had lived since his entrance into the hospital. Going to his bed, he took from his shelf a comb and glass; then combed his hair, brushed his beard, adjusted his collar, and opened his vest, proceeding with care in all the details of his toilette.

M. Maury turned his glass round, but he continued his toilette with none the less pains, regarding himself as before, in a glass which no longer reflected any image. Evidently he was preparing himself for a theatrical representation. He took from his bed the coat which he had laid aside, and directly casting it one side,—it was his hospital blouse,—he passed his hands rapidly over his chair and the window-sill, manifesting some impatience.

This expression of discontentment was too clear for any one of us not to see that he missed a coat that was in keeping with the idea that he was following, and that his walking coat, which as usual was on some neighboring article of furniture, was not

at all suitable to his notion. One of us took off his own, and placed it in the patient's hands, when he at once put it on. His eye was attracted by the brilliance of a red ribbon; he touched it, regarded it closely, and carried it away. On his bed he chanced to meet with several numbers of a periodical romance, which he turned rapidly over without finding that for which he was searching. What could he be searching for except some sheets of music? I took one of these numbers, rolled it up, and putting it into his hand in that condition, satisfied his want by this semblance of a roll of music, for he then took his cane and traversed the ward with a slow step, well contented. When stopped on his way, for the purpose of taking off the coat he was wearing, he permitted it without offering any resistance. The nurse put his own blouse into his hands, and he put it on, looked for his button-hole bouquet, noticed his ribbon of the military medal, and appeared satisfied. He nimbly descended the stairway which he daily frequented, traversed the court of the hospital with the air of a man of business, and went toward the gate of exit. Arrived there, I prevented his passage and turned his back to the gate; he allowed this without any resistance, and then started off in the new direction I had given him, and, in groping about, entered the lodge of the door-keeper, which opened into the hall where we were.

At this moment the sun lit up with a bright ray a glass window that closed the lodge on the side towards the court. He seemed to be not at all insensible to the brilliance of this ray, which probably caused him an illusion of vision, by bringing forward a sensation in keeping with the idea he had in his mind. This ray must have given him the impression of a footlight, for he at once placed himself before it, readjusted his toilette, opened the roll of paper which he carried in his hand, and softly hummed an air, running his eyes over the pages as he slowly turned them, and marking with his hand a measure that was perfectly rhythmical. Then he sang aloud, in a highly agreeable manner, giving his song the correct expression, a patriotic ballad to which we all listened with pleasure. This first selection terminated, he sang a second, and afterwards a third. We then saw him take out his handkerchief to wipe his face. I offered him a wine-glass of a

strong mixture of vinegar and water, which he did not notice; I placed the glass under his nose without his perceiving the smell of the vinegar; I put it into his hand, and he drank it without complaining of any unpleasing sensation.

What part had the sense of hearing, absolutely closed to impressions from without, played in this perfect rendering of the three ballads which we heard him sing? Did he hear himself sing? Did he have any real perception of his voice, when he neither heard mine when I spoke, nor the various piercing noises which we caused to resound in his ears? In the same manner as in a preceding experiment on the sense of sight, we have proved that he saw the match that he held in his own hand, and yet remained entirely unconscious of the match that I offered.

The scene which we witnessed did not permit of our settling the question, for the starting of his songs might have been a simple automatic movement, just as the fierce struggle between himself and the Prussian soldier, at the time when he believed himself armed with a gun, was nothing more than a remembrance re-enacted. His gestures, bearing, his inflections of voice, the shades of warmth and sentiment which he expressed in his singing, were all learned a long time previously, and repeated a great number of times, and therefore might only be an episode of his usual mode of life, a simple reminiscence, an unconscious vocal expression, as automatic as any of the other events that transpired before us. We had the strongest desire to solve this new problem by a decisive experiment; and it was still by means of the impressions of touch that we purposed to examine the sense of hearing.

We know that the contact with a pen produced in F—— a desire to write; we know that a quantity of tobacco placed in his hand gave rise to a wish to smoke, and hence we thought that in causing him to find a bow in his way we might suggest to him the thought of music, for he had been accustomed to use the violin in practicing his songs. With this purpose we had provided a violin, which was completely out of tune, and which we purposed placing in his hands; and we were expecting in this experiment to find a complete demonstration of the competence or of the incompetence of the sense of hear-

ing, according as F—— was able to tune up the violin and use it in his accustomed manner or not. But the attack terminated before we could make this simple trial, which we propose to carry into effect during our patient's next paroxysm.

This scene, which I have endeavored to faithfully reproduce, is interesting on account of the connection of events which followed each other after the letter written in our presence to his friend; it marked the moment when the idea of the concert presented itself in his mind. From that time until he carried the idea into execution everything harmonized and co-operated towards the same end, and he followed the same purpose during at least three-quarters of an hour without a moment's distraction.

Here is one of the specially interesting points in this experiment, for it clearly indicates the essential difference that exists between the psychological state of sleep and of dreaming, and the special conditions which the disease of F—— has effected in his cerebral innervation. The automatic exercise of the memory is, in each instance, the point of departure for the dream and the movement; but the dreamer is not independent of external influences; one can influence him by changing his dream, and giving a fresh impulse; one can, by pricking the skin lightly with a pin, cause him to dream of a duel, or by lighting his chamber, he can be made to dream of flames and fire; the cerebral action provoked in him is always in connection with the sense upon which the excitation has been produced.

In the case of F——, one sense alone preserved his relation with his external surroundings; the impressions of this sense roused in him movements of the brain corresponding to the influences from without, just the same as in the ordinary sleeper; but when the idea was once in existence F—— followed it out and executed it without any turning aside; when obstacles were interposed he passed around; when stopped in his course and disrobed, he rearranged his toilette and marched on toward his purpose; when, as he was about to leave the hospital, I prevented his exit, and changed his direction, it made no difference whither he went, he was on his way to the concert. A bright window produced an illusion in support of

his idea; he believed himself in the theatre, and he sang. A strange mixture of obscure sensations, illusion of the senses, and hallucinations, at the service of a blind impulse, bereft of all spontaneity!

Pursuing the comparison, we find the differences more and more strongly marked. The dream vanishes at the slightest alarm of the torpid senses; it also ceases spontaneously from the simple effect of the painful or affecting sensations, which oftentimes are fostered by itself; in F—— the connection with life is suspended at such a point *that waking is impossible, whatever efforts may be made to provoke it.* Any stimulations of the skin are useless; the electrical currents of an energetic battery produce no pain, whether applied with sponges or metallic conductors. During one of his attacks I have seized F—— by the shoulders and thrown him violently to the ground upon the green sward when we were walking together, but he did not manifest any emotion; feeling of the turf with his hands in order to get an idea of the spot, he has raised himself again, calm and impassive.

These are some of the characteristics belonging to a certain class of cerebral neuroses, of which science only possesses rare examples, but the study of which affords great interest on account of the peculiarity of their expressions and of the instinctive impulses which these diseases sometimes present. *The disturbance which these functional perversions of the nervous system bring into the course of the life, extends not only in connection with the organs of sense and to intellectual actions properly so called, but it also sometims awakens some instinctive excitation, which abandons the individual, without any defense, and destitute of the discernment of reason, to the most deplorable impulses. He acts with the appearance of freedom which he does not possess; he seems to prepare and combine certain actions, when he is only in reality a blind instrument, obedient to the irresistible impulses of an unconscious will.*

In each of these attacks we find that F—— is controlled by the desire to steal; he purloins everything that lies within his reach, and conceals it with dexterity.

Another individual contrives his self-destruction, and mys-

teriously prepares, in the midst of a large company, the means for effecting the suicide. I have been present at two attempts at suicide, one by poisoning, the other by hanging, which I have allowed to proceed to the uttermost limit of experimenta tion; I have cut the cord at the moment of the commencement of asphyxia.

Another individual becomes a homicide.

Another becomes an incendiary.

And after the accomplishment of these unhappy acts, the attack passed, the patient awakens, resumes the usual practice of his normal life, without preserving any remembrance of the pathological period which he has passed through. Conducted before the judge, he denies the accomplished fact, of which he really is in ignorance, while his participation is evident to all.

When considered from this stand-point, the study of pathological somnambulism, in its relations with lucid intervals and legal responsibility, offers features of a new and most highly interesting character.

Reviews and Bibliographical Notices.

I.—THE SYMPATHETIC NERVOUS SYSTEM.

I. LECONS SUR L'APPAREIL VASO-MOTEUR. (PHYSIOLOGIE ET PATHOLOGIE.) Faites a la Faculte de Medicine de Paris. Par A. Vulpian, etc., etc. Redigees et Publiees par le Dr. H. C. Carville, etc. Tome Premier. Paris: 1875, p. 571. (*Lectures on the vaso-motor apparatus, etc.*)

II. LECONS SUR LES NERFS VASO-MOTEURS, SUR L'EPILEPSIE, ET SUR LES ACTIONS REFLEXES NORMALES ET MORBIDES. Par le Dr. Brown-Sequard. Traduites de l'Anglais par le Dr. Beni-Barde. Paris: 1872, p. 211. (*Lectures on the vaso-motor nerves, etc.*)

III. DES NERFS VASO-MOTEURS. These pour le Concours d'agregation (Anatomie et Physiologie), par le Dr. Charles Legros. Paris, 1873, p. 111. (*The vaso-motor nerves.*)

IV. LEZIONI DI FISIOLOGIA SPERIMENTALE SUL SISTEMA NERVOSO ENCEFALICO. Date. Dal. Prof. Maurizio Schiff. Nel R. Museo de Firenze, l'Anno, 1864–65. E. Compilate per cura del Prof. Pietro Marchi. Seconda Edizione, Rivista ed Augmentata. Firenze, 1873, p. 548. (*Lectures on the experimental physiology of the central nervous system, etc.*)

V. KRITISCHE UND EXPERIMENTELLE UNTERSUCHUNG DES NERVENEINFLUSS AUF DIE ERWEITERUNG UND VERENGERÜNG DER BLUTGEFÆSSE. Preisschrift von Gustav Rœver. Rostock, 1869, seite 118, zwei Tafeln. (*Critical and experimental investigation on the influence of the nervous system on the dilatation and contraction of the blood-vessels, etc.*)

VI. SULL' ANATOMIÀ PATOLOGIA DEL GRAN SIMPATICO. MICHEL FOA. (Rivista Clinica de Bologna. Fasc, 7–8--9, 1874.) (*On the pathological anatomy of the great sympathetic, etc.*)

VII. BEITRÆGE ZUR HISTIOLOGIE U. PATH. ANATOMIE DES SYMPATHISCHEN NERVENSYSTEMS. Von Dr. Alexis Lubimoff aus Moskau. *Virchow's Archiv. f. Path. Anat. u. Klin. Med.* Band 61. Heft 2, s. 145. (*Treatise on the path. anatomy of the sympathetic nervous system, etc.*)

VIII. ON THE FUNCTIONS OF THE SYMPATHETIC SYSTEM OF NERVES, AS A PHYSIOLOGICAL BASIS FOR A RATIONAL SYSTEM OF THERAPEUTICS. By Edward Meryon, M. D., etc. London, 1872, p. 68.

In this paper it will be our aim to make a pretty full survey of the most important recent works on the anatomy, physiology, and pathology of the sympathetic nervous system. We have purposely omitted, and for various reasons, several papers, especially the recent work of Eulenberg and Guttman on the *Pathology of the Sympathetic*, because, in the case of the latter, Eulenberg is soon to write on the same subject in his contribution to Ziemssen's *Handbuch*, now in course of publication. When that work shall appear, it is our intention to notice the labors of these authors.

The volume, the title of which stands at the head of our list, we look upon as one of the most important, as it is certainly one of the most interesting works that has lately appeared in relation to the nervous system.

It is written by one of the most accomplished of the younger school of physiologists, of which there are so many brilliant representatives rising into prominence at the present time. Among them all, we know of no one who is likely to attract more attention in the immediate future than is Professor Vulpian, the successor of Dr. Brown-Sequard in the chair of Experimental and Comparative Pathology, in the Faculty of Medicine in Paris. Before the appearance of this work, he had been known not only as one of the most skillful and talented experimenters in the province of physiology, but as the author of various important and interesting memoirs, read before the societies of medicine and biology, at Paris, and as the author of larger and more permanent additions* to our knowledge of the difficult field he has chosen—that of the nervous system.

Professor Vulpian unites in a rare degree, the qualities of an original investigator and critic. Possessed of all the enthusiasm and zeal of the former, he exhibits all the coolness and caution of the latter. While he is held rigidly in check by the wholesome but too often chafing restraints of a true scientific method, yet a vivid imagination is permitted to play, so as to impart a certain warmth and splendor to his prelections, that reminds one of the clear animated style of Trousseau and Bernard.

The naturalness of method, and transparency of diction, for which the best French writers are celebrated, is well represented in the work at present under consideration. This first volume consists of fifteen lectures reported phonographically. Several of them substantially the same as we find them here, appeared during the year in the *Revue Scientifique.* But here they are given *in extenso*, in a more complete form. The first lecture opens with a history of the progress of discovery in relation to the vaso-motor nerves. This history he divides into two periods:

1.—"*Lecons sur la Physiologie Generale et Comparee du Systeme Nerveux," etc. 1866

2.—"La Moelle Epiniere." In the Dict. Encycloped. des Sciences Medicales. 1874. Tome viii., 3d series.

an *ancient* and a *modern*, the latter beginning with the discoveries of Bernard.

One of the first notions looking toward the discovery and understanding of the relation of the nervous system to the small vessels, was to show that the latter are contractile. The credit of first mentioning this fact, is due to Senac, or according to Longet, to Abr. Ens, whose work was published at Utrecht, in 1745. Haller admitted the contractility of the small vessels, but with his usual accuracy of statement, explained that he did not refer to muscular action, but to a sort of elastic condition of the vessels.

Although experimental proof of the contractility of the small arteries, had been given by various authors before him, yet, Bichat in his *Anatomie Generale*, refused to admit that the arteries had any such a capacity, or structure as that capacity implied.

But soon the proofs that the vessels are not simply elastic, but contractile, multiplied to such a degree, that there could be no longer any doubt.

The next step was to show, that the nervous system exercises an influence over the vessels. This was claimed, but not demonstrated by Senac. With him must be ranged Bœrhaave. But the history of the progress of discovery, from this point down to our own time, in regard to the control over the contractile vessels by the vaso-motor nerves, has been already given with some fullness in the Journal during the past year, in the lectures on the "Pathology of the Vaso-Motor Nervous System."

He discusses the claim made by Schiff in his own behalf, and that of one of his students (Meyer,) to priority in the real discovery of the vaso-motor nerves, and as the majority of other critics have done, gives the credit to Bernard, who so early as 1851, gave experimental proof of the existence of such nerves, and showed in part the nature of their influence over the muscular vessels. We say in part, because the first experiments of Bernard only showed the effect on the vessels of division of the cervical sympathetic, or of destruction of the superior cervical ganglion of the sympathetic.

The effect of irritating, or stimulating the peripheral end of the divided nerve, appears to have been first discovered by Brown-Sequard. Bernard, it is true, discovered this independently, but the credit of opening the path of investigation in regard to the influence of the vaso-motor nerves on the vessels, may be fairly divided between these two eminent physiologists, Bernard making known the effect on the vessels of division, and Brown-Sequard that of stimulation of the vaso-motor nerves. Both experiments were required to demonstrate from opposite directions the fact, that the muscular vessels are completely under the control of the nerves in question. But this point once made known, the field was fairly cleared, and since then no other province of physiology has had a more brilliant or successful host of workers. And among them all, no one has done better original

work, or has been more successful in bringing to the test of practical utility the labors of others, as well as his own, than has Professor Vulpian, in the present work.

In 1851, MM. Brown-Sequard and Tholozan made and reported some experiments, that showed that the vaso-motor nerves may act in a reflex manner. The original experiment was as follows:

If one hand is plunged into cold water, and at the same time a thermometer is held in the other, immediately a notable fall in the temperature of this latter hand is shown. By examination it was found that the reduction in temperature was due to a contraction of the vessels of the hand, by which means a sudden reduction in the volume of blood in the hand occurred, and hence the reduction in temperature.

This discovery we look upon as one of the greatest importance to physiology and pathology, especially as regards the vaso-motor nervous system and local changes in blood supply with all the consequences of the same.

Here, then, we have so early as 1851 or 1852, three capital facts established in regard to the vaso-motor system.

1. Division of the vaso-motor nerves belonging to the vessels of a part leads to a loss of *tonus* or temporary paralysis of the muscular tissue of the vessels. Hence they enlarge, and so admit more blood than they should normally do, producing passive congestion.

2. *Irritation* of the trunk or branches of the sympathetic, leads to contraction of the related muscular vessels, and hence to anæmia.

3. The action of these nerves on the vessels does not depend alone on the immediate action of depressing or irritating agencies, but may act in a reflex way in obedience to impulses from parts of the body remote from the seat of vaso-motor disturbance. Subsequent researches have served rather to carry out these truths into their various relations in health and disease than to discover new ones.

Besides determining the anatomical and physiological relations of the vaso-motor nervous system to the vessels and its modes of action, another important question remained to be settled, viz.: As to the true relation between the sympathetic and cerebrospinal nervous systems.

M. Vulpian, in relation to this question, adopts the views of Bidder, Volkman and Waller, that the fibres connecting these two great divisions of the nervous system pass both ways, and principally by the channel of the anterior or motor root of the spinal nerves. Those that pass from the cord to the sympathetic ganglia are the "medullary roots of the great sympathetic," while the fibres which pass from the ganglia to the cord are for the purpose of supplying the vessels of the white and gray matter of the cord with vaso-motor nerves. This latter opinion of our author, we think, only expresses a part of the truth. We

believe a certain portion of these fibres pass into the cord for the purpose of conveying impressions into the cord for reflex purposes in vascular action. These impressions which we believe to be carried into the same, we suppose to be projected into the vaso-motor centres of the cord, which, in this view, become centres for reflex action. If there are such centres in the cord, and it has been well established that they exist, and if they act in a reflex way, where do the impressions come from that excites them to such action, if not in the way we have supposed?

We do not think, therefore, M. Vulpian's views as to the use of the fibres which pass from the ganglia of the sympathetic to the cord, are comprehensive enough.

In speaking of the solar plexus, he mentions that the fibres which it gives off to the intestinal canal, terminate in two different ways therein. Certain fibres from the solar plexus terminate in the cells of the plexus of Auerbach, which lies between and supplies the two muscular coats of the alimentary canal, while others terminate in the plexus of Meissner, which lies in the submucous tissue beneath the mucous membrane of the bowel, and which plexus gives off fibres to the rich network of vessels in the mucous membrane of the intestine and to the anatomical elements of the same membrane.

In speaking of the general anatomical disposition of the vaso-motor nervous system, he admits the existence of vaso-motor centres in the gray matter of the spinal cord, then next in order the ganglia on the "fundamental chain" of the sympathetic on either side of the spinal column, and finally a peripheral apparatus of ganglia, found in different parts of the body, as in the heart, wall of the intestine, or bladder, or uterus, or muscular vessels, or glands, etc. These are all connected together by intervening cords which belong to the class of gray fibres. This part of the nervous system, like the cerebro-spinal, acts chiefly, if not wholly, in a reflex way. In short, the views to which M. Vulpian has been led in his elaborate study, are in all respects similar to those which were set forth during the past year, in the pages of the Journal, in the lectures published on the "Pathology of the Vaso-Motor Nervous System." This terminates what our author has to say on the anatomical arrangement of the sympathetic nervous system. We have dwelt on it, because we deem it important, and because we feel that it has been too much the custom of physicians to hurry over or away from the facts of anatomy and physiology, more especially in respect to the nervous system, in their ill-regulated haste to get at *practical* matters.

So far as it is possible for us, we wish to call emphatic attention to this pernicious and short-sighted practice, and recommend physicians generally to a more careful study of these topics as absolutely indispensable to a better knowledge of the diseases of the nervous system.

Our author next passes to a careful examination of the *structure* of the small vessels, which, as is well known, is distinctly

muscular, both in the arteries and the veins. The muscular fibre is of the unstriped kind.

The chief object of this part of the work is to show how the vaso-motor nerves terminate in the muscular tissue of the vessels. This subject received attention in the JOURNAL during the year, and beyond the matter there given the lectures of M. Vulpian do not carry us.

In the second lecture, the contractility of the arteries and veins under the influence of various excitants, mechanical, chemical, etc., is considered. It simply shows in an interesting manner that the muscular vessels will contract, either under the direct application of stimulants or on account of their action on the vaso-motor nerves distributed to them. The literary references in this lecture are very numerous and well nigh exhaustive. Both the arteries and veins are shown to be contractile.

The applications made by our author to pathology, of the facts gathered from a study of the mode of action of excitants on the vessels,. whether direct or indirect, through the agency of the nervous system, are full of interest. He denies the correctness of the observations made by Legros and Onimus, as to the effects of the galvanic current on the circulation of a part. These physiologists reported that, if the current is made to pass from the centre towards the periphery the vessels are made to expand, and hence the circulation is increased. A contrary effect was observed, if the current is caused to pass in the opposite direction. This M. Vulpian denies.

He discusses the contractility of the veins, which is much less than that of the arteries, and mentions the fact that the sinuses and larger veins, at any rate of the brain, are devoid of muscular tissue, and, therefore, of contractility. This fact should be remembered in considering the circulation of the brain. As to the capillaries, M. Vulpian does not believe they are contractile.

In the latter part of this lecture is a full and critical discussion of rythmical or peristaltic action of the muscular vessels. He admits its existence, but thinks that its influence has been exaggerated as an aid in the circulation of the blood.

The third lecture is given to a particular study of the phenomena which follow section and stimulation of the sympathetic nerve. The former, as is well known, leads to temporary enlargement of the related vessels, and the latter to contraction of the same.

Very properly M. Vulpian insists that the congestion which occurs in a part, when its vaso-motor nerves are divided, is not inflammatory in character.

This lecture gives a full and admirable *resume* of what has been done in regard to the influence of various conditions of the vaso-motor nerves on the calibre of the muscular vessels. In this lecture the subject of "*Neurility*" is discussed, as regards the sympathetic nerve fibres. By "Neurility" is meant the conducting capacity of a nerve fibre. The opinion of M. Vulpian

is that the conducting capacity of the vaso-motor nerve fibres is the same as that of the cerebro-spinal nerves. As a proof of this he cites the experiments of himself and M. Philipeaux, which consisted, as is well known, in dividing the cervical sympathetic high up in the neck in an animal, and also at the same time, and in the same animal, the hypoglossal. The peripheral end of the hypoglossal was then united to the sympathetic. When the union, at the end of two or three months, was complete between the two nerves, the hypoglossal was divided near the tongue. Upon irritating this portion of the hypoglossal, cut loose from the tongue at one end, and soldered to the cervical sympathetic at the other end, contractions of iris followed, the same as follows irritation of the sympathetic itself. The conclusion which may be drawn from this experiment is quite obvious. It is that the same impressions may be conducted indifferently by different kinds of nerves. This conclusion, however, M. Vulpian does not now hold to be strictly correct, according to a note read at a recent meeting of the Societe de Biologie, at Paris.

In speaking of the action of Woorara on the motor nerves, he notices the slowness of its action on the vaso-motor nerves and unstriped muscular fibres, and gives expression to an opinion as to its mode of action on the cerebro-spinal motor nerves, and voluntary or striated muscles. He denies that the poison acts on the gray matter of the brain and cord, or motor nerve fibres, or on the muscular fibre. He says: "We believe that the poison acts at that point where the end of the nerve fibre comes into relation with the muscular fibre, and that the toxic agent produces its effect without altering, physiologically, either the one or the other of these elements. The nerve fibres are, in a certain sense, detached, physiologically, from the muscular fibres into which they penetrate. This is the theory I have adopted and now maintain." (P. 118.)

The use that is made by M. Vulpian of the action of Woorara on the voluntary motor nerves, is in discussing the state of the vaso-motor nerves in certain paralyses. He says :—

"In a case of radial paralysis that I have had recently under treatment, I observed, some time, it is true, after the beginning of the affection, that faradization of the radial nerve had no influence on the muscles supplied by this nerve. They remained inert, and in remarkable contrast with the strong contraction provoked by direct faradization of the same muscles. Had the radial nerve in this case entirely lost its conductibility or excitability? It was easy to be convinced this was not so, for all those parts of the skin supplied by this same nerve, had preserved their sensibility. Consequently the sensory fibres of the nerve remained excitable, and capable as ever of conducting impressions. On the other hand, that which interests us now above all else, was, that irritation of the skin in these same regions, either by mechanical or galvanic excitants, produced vascular contractions and dilatations that could be ascribed only to reflex vaso-motor action. The vaso-motor fibres contained in the radial nerve had therefore preserved their motor conducting capacity. From these facts it results, in all probability, that the motor nerve fibres were in the same condition as in an animal poisoned by Woorara. The nerve had preserved its conducting capacity (neurility), and also the muscle its contractility. But the motor muscular fibres had lost their normal capacity for causing contraction of the related muscles."

And this paralysis was not due to disease at the motor nerve centre, nor to disease of the muscle itself, nor to loss of neurility in the nerve, but to some defect in the normal relation of the terminal end of the motor nerve fibre (Endplatten), and the muscular fibre. M. Vulpian thinks it worth while to enquire in cases of paralysis of limited groups of muscles, in which the muscles preserve on the one hand their electrical excitability, and the sensory and vaso-motor nerve fibres of the involved nerve their neurility, whether the paralysis is not due to some cause that acts as the Woorara is believed to do.

But to return from this interesting digression. In lecture IV. we have adduced various clinical proofs of the influence of lesions of the sympathetic on the vascular system. In the beginning of this lecture M. Vulpian calls attention, very properly, as we think, to the action of the veins under impulses from the vaso-motor nerves. He notices as a fact to be deplored, that thus far our information on this point is meagre, and almost valueless. We have for a long time felt that this subject demanded and would reward careful study. The veins have been comparatively neglected in the study of both general and local variations of the circulation in the small vessels, from the normal standard.

If the veins dilate, pressure in the capillaries will be diminished. If they contract, as it seems probable they may, the pressure in the capillaries would be increased, and a tendency to capillary stasis might result. This, if it should occur in fact, would lead to œdema of a part, and various changes in it of color, temperature, etc. We cannot dismiss this subject without expressing the opinion that it deserves careful investigation.

We cannot now enter on a full examination of this part of M. Vulpian's work. Suffice it to say, that the effects of pathological lesions of the sympathetic on the circulation in the small vessels, agrees, in the main, with experimental results, viz.: Affections of the vaso-motor nervous system lead either to vasal dilatation or contraction.

In this lecture we have also a discussion of the subject of vaso-dilator nerves. This part of the lecture opens with a critical historical *resume.* M. Vulpian particularly refers to the phenomena first observed in connection with the submaxillary salivary gland. The peculiar point being the effect of irritation of the chorda tympani, or "secretory" nerve, which is distributed to this gland. It is well known that two phenomena follow the irritation: 1, great dilatation of its small vessels, both arteries and veins, and, 2, greatly increased flow of saliva. This latter phenomenon implies an increased activity of the secreting structure of the gland. There can be but little, if any, doubt, that it depends immediately on an excitant influence conveyed to the secreting cells of the gland by means of the chorda tympani nerve. The real point of difficulty is to explain the dilatation and other phenomena which the vessels present. They are as follows: 1, enlargements of all the small vessels of the gland;

2, very active pulsating action of both arteries and veins; 3, a greatly increased flow of blood through the vessels of the gland. How does M. Vulpian explain these phenomena? He passes in review the former opinions of Schiff and Bernard, who supposed that the vaso-dilator nerves act on the muscular tissue of the vessels as the vaso-constrictors are believed to do. Very properly this hypothesis is rejected. He also rejects the hypothesis as inconsistent with the facts, which would make dilatation of the arteries and capillaries depend on contraction of the veins.

He then states the view of Brown-Sequard, who adopts the opinion of Prochaska, and other old writers, that certain nerves go not to the vessels, but to the cells—anatomical elements, of a part. These, being irritated, have their affinity for arterial blood increased. This constitutes the *vis a fronte* of the circulation of some authors, and hence more blood is drawn into the part, and hence the congestion. M. Vulpian seems favorably disposed toward this hypothesis, but does not adopt it, and indeed offers cogent proofs against it.

In this connection our author mentions the effect of atropine, when taken in poisonous doses, on the salivary secretion and its nervous apparatus. If an animal is poisoned with atropine, and the submaxillary gland is laid bare, and the lingual which contains the chorda tympani nerve is divided, and the duct of Wharton is divided and furnished with a canula, and the case observed, the following phenomena appear: The secretion from the gland is almost or quite abolished, as an effect of the atropia. Now if the lingual nerve is irritated there is seen immediately, congestion of the vessels of the gland, but no increase of the flow of saliva from the divided duct, which, however, always occurs in the healthy animal.

While under the influence of the atropine, irritation of the lingual nerve will not produce an increase of salivary secretion—notwithstanding the increased blood supply in the gland—the vaso-dilators are made to act, but not the "secretory." How shall we explain this?

M. Vulpian explains this case by supposing, and we think correctly, that the chorda tympani contains two kinds of nerves—vaso-dilators and secretory nerves—the latter being distributed to the secreting substance of the gland. But he does not endeavor to carry his explanation of this case any farther, so far as the secretory nerves are concerned. However, he explains finally the action of the vaso-dilators in this, and all other cases, by supposing that they terminate peripherally, not in the muscular tissue of the vessels, but in the small tonic centres or nerve cells found in the immediate neighborhood of the muscular vessels, and upon these the vaso-dilators act, so as by an action of arrest—inhibitory action—to diminish the *tonus* of the vessels, and hence to permit them to enlarge under the expansive pressure of the contained blood. We mention this explanation so fully in this place not only because it seems probable, but be-

cause it exactly agrees with the explanation given fully in the April number of this journal, in the lectures on the "Pathology of the Vaso-Motor Nervous System."

But the next question of importance in this case of atropine poisoning, is that which arises when we enquire how we can have the action of secretory nerves in the chorda tympani abolished, while the action of the vaso-dilators in the same nerve trunk remain in tact. On this point M. Vulpian throws no direct light, so far as we have seen, and yet it is a question of no small importance. It really involves, in one way or another, as we have elsewhere shown, the whole question as to the share the nervous system has in the production of active congestions and inflammations.

(*To be continued.*)

II.—PSYCHOLOGICAL MEDICINE.

I. A Manual of Psychological Medicine, Containing the Lunacy Laws, the Nosology, Ætiology, Statistics, Description, Diagnosis, Pathology, and Treatment of Insanity, with an Appendix of Cases. By John Charles Bucknill, M. D., etc., and by Daniel Hack Tuke, M. D. Third revised edition, illustrated and much enlarged. Philadelphia: Lindsay & Blakiston, 1872. Pages 824. Chicago: Jansen, McClurg & Co.

II. The Science and Practice of Medicine in Relation to Mind, the Pathology of Nerve Centres, and the Jurisprudence of Insanity. By J. Thompson Dickson, M. A., M. B. Cantab.

In the whole range of psychological medical literature, we know of no manual that better meets the wants of the profession, or fills the best conception of what such a work should be, than this last edition of the well-known volume of Drs. Bucknill and Tuke. The first edition, which appeared in 1858, was a notable advance on anything which had until then appeared in the English language, and this third edition, rewritten and greatly enlarged, is on some accounts not behind any similar work in any language. Neither so brilliant and suggestive as the work of Dr. Maudsley, or even the admirable manual of Dr. Blandford, but practically more valuable than the former, not only on account of a difference in form, but intrinsically, it yet exceeds in fullness, and every way in accuracy of statement and purity of style, the work of the lamented Dr. Dickson, which stands second on our list.

While it is not so severely formal in its method, nor so replete in literary references, as the work of Griesinger, it yet surpasses in fullness and practical value the manuals of Leidesdorf and Schrœder van der Kolk, and equals in every respect the best recent French works on the subject of which it treats, such as those of Morel, Falret, Dagonet, Marce, and others.

This edition not only embodies the vast personal experience of its authors, whose names are well known among alienists all over the world, but also the results of a rare and extensive reading, that seems to have been much widened since the issue of the earlier editions, and which, it is fair to presume, can hardly be adequately represented by the somewhat scanty bibliographical references their work contains.

The first four hundred pages are written by Dr. D. H. Tuke, while the remainder is written by Dr. Bucknill, with the exception of a new chapter on "Morbid Cerebral Histology" by Dr. J. Batty Tuke, of Edinburg.

The work as at present constituted is divided into seven chapters: I. "Legal Enactments in Reference to the Insane, including those specially affecting medical men," 17 pages. II. Of "Insanity in General," 132 pages. III. Of the "Various Forms of Insanity," 160 pages. IV. "Brief Sketch of the Various Forms of Insanity from a Somato-Ætiological Point of View," 74 pages. V. "Diagnosis of Insanity," 82 pages. VI. "Pathology of Insanity" and "Morbid Histology," 151 pages; and finally, VII. "Treatment of Insanity," including an "Appendix of Cases," 166 pages. Besides this there are numerous instructive drawings, chiefly representing morbid histological changes.

Of course, in the limits of an ordinary review, it will not be possible to do more than glance at the salient features of the work. This is all we can pretend to do in this place.

Excellent and instructive as the first chapter is, it contains but little we can find space to discuss now. We would, however, call attention to the remarks on the "Definition of Insanity," more particularly for legal purposes. Dr. Tuke says, under this head, "Whatever definition of insanity is adopted by the student, it is all-important that he should regard bodily *disease*, including *defect*, as an essential condition; in other words, insanity is a condition in which the intellectual faculties, or the moral sentiments, or the animal propensities,—any one or all of them—have their free action destroyed by disease, whether congenital or acquired. He will not go far wrong if he regard insanity as a *disease of the brain (idiopathic or sympathetic) affecting the integrity of the mind, whether marked by intellectual or emotional disorder*," etc., (page 20).

On page 23 Dr. Tuke gives Dr. Bucknill's definition of insanity. It is that insanity "is a condition of the mind, in which a false conception or judgment, a defective power of the will, or an uncontrollable violence of the emotions and instincts, have separately or conjointly been produced by disease."

Of the two definitions we have no hesitation in expressing a preference for the latter. But we do not deem a satisfactory definition possible in the present state of medical science. Unobjectionable definitions imply of necessity perfect knowledge of the subject to be defined, and this no one can rationally pretend to have of insanity. Our definitions of a subject must partake of all the infirmities of our knowledge of it. Subsequently our author gives the received legal definitions of insanity, as they stand in British jurisprudence, and which are not more free from objections than those rendered from a medical point of view.

Then comes the vexed question of classification, and all the best known systems are duly considered. They are grouped in the main under the following heads: Psychological, Physiological, Ætiological, and Pathological. Dr. Tuke says, and we think justly, "We would insist strongly on this truth: *Let us regard the subject from all sides, and not shut up every avenue of approach but one*" (p. 28). Want of space alone prevents us from quoting many of the truly excellent remarks made in commenting on particular systems of classification, and the tendencies at present so extensively exhibited against the so-called "Psychological method," and especially against what it has pleased many writers to decry under the name of "Metaphysics."

In the course of extended and generally judicious remarks, historical and critical, on systems of classification, he gives among others the much praised system of Dr. Skae, of Scotland. But we must say that we have never been able to see any peculiar or striking merit in it. It is but little better than a mere list of prominent kinds of insanity, in which it would seem, without seriously violating any true principle of order, one might transpose to different positions in a linear series, any member of the series. The order is not organic or logical, but rather arbitrary or artificial. The only value the scheme appears to have does not consist in the ascertained and established relations of groups, but in the actual or presumed distinctness of individuality of the groups themselves.

The system adopted by the authors is the same as that of the earlier editions, which it may be presumed is so well known as not to require mention here. We will only observe that a prominent place in the system is given—and, we think, properly—to *Moral* (Emotional) Insanity. They object, and with good reason, to the use of the term "Monomania." "For, if understood in a literal sense, its very existence is disputed, and if not, the various morbid mental conditions it is made to include by different writers leads to hopeless confusion" (page 55).

But, as was said in regard to definitions of insanity, so in respect to classifications. No unobjectionable system of classification of the kinds of insanity can be given, or satisfactory analysis of the whole mass of morbid phenomena included under the term can be made, so long as our knowledge of mind and the nervous system, in health and disease, is so incomplete, and in so

many respects erroneous as it is. Perfect systems of classification, as well as perfect definitions, imply perfect knowledge of all the phenomena of a case, and also of their true relations. This no one can pretend to have. No one has yet attained that commanding position from which the whole field may be surveyed at a glance, and from which its limits and contents may be declared. But different stand-points have been and must be taken, such as the Psychological, Physiological, Ætiological, Pathological, etc., and from any one of which the truth can be only partially discerned, while many facts, which can be seen only from a different stand-point, must at least be neglected or misconstrued. Hence the clashing and imperfections amongst systems of classification. Our authors seem to be perfectly aware of the difficulties of the case, and of their sources.

We next come to the *causes* of insanity, concerning which there is probably less precise knowledge than of almost any other part of our subject, and for manifest reasons.

Early in this chapter mention is made, with apparent approval, of the opinion of Dr. Crichton Browne, of the West Riding Asylum, in England, that no small proportion of cases of insanity are due to injuries inflicted on the head of the child during birth, either by reason of a narrow or distorted pelvis, or by the use of forceps. But we would accept, not only the opinion, but the proofs of it, with considerable hesitancy. In regard to marriages of persons having a hereditary taint of insanity, Dr. Tuke advises, we think very properly, rather strongly against it. Insanity, our authors, in agreement with others, would make more common among civilized than barbarous peoples, and more common among the lower or degraded than the higher and cultivated classes of society. Celibacy would seem to be more favorable to insanity than the married state. As regards the immediate or exciting causes of insanity, the authors of this work place "intemperance" in the front rank of "physical" causes, while in the list called "moral," "domestic troubles and grief" stand first, the latter cause or group of causes having a larger share of victims than intemperance. In this connection he quotes the results arrived at by M. Lunier, in his elaborate study of the part which alcoholic drinks play in augmenting cases of insanity and suicide.* If we had the space we would be glad to quote them here. The remarks on prognosis are especially full of interest, but want of space prevents us from noticing this part of the work at length. But among kinds or phases of insanity that are regarded as unfavorable for recovery we may mention dementia, general paralysis, epileptic insanity, delusional insanity, climacteric insanity, typhomania, circular insanity, &c. Apoplexy and paralysis, perversions of the moral sense from disease are unfavorable complications

---

*"Du role que jouent les boissons alcooliques, dans l'augmentation du nombre des cas de folie et de suicide. Par L. Lunier. *Ann. Med. Psycholog.*, p. 325. 1872.

of insanity, as are also, "a fear of poverty, refusal to take food, a disposition to commit suicide, suspicions of persecution, or of poison being put in the patient's food."

On the other hand, acute mania, acute melancholia, simple depression of mind, hysterical insanity, and in general, sympathetic rather than idiopathic insanity, puerperal insanity, &c., may be looked upon as favorable for recovery.

The recovery of physical health, unaccompanied by a return to sanity, is to be regarded as unfavorable, while increase of flesh under such circumstances may be regarded as the harbinger of dementia. Restored affections are to be looked upon as one of the most promising signs of returning mental health, as also a return to natural habits and tastes. The return of suspended secretions is to be looked upon as favorable. Return of sleep is a favorable indication. Pregnancy is unfavorable to recovery from insanity. Such are a few of the practically valuable, though not novel, results of experience, as given in the chapter on prognosis. It is furnished with an appendix, which is made up of the generalizations of our talented countryman, Dr. Isaac Ray, and whose experience does not always coincide with that of our authors.

In the chapter on "The Various Forms of Insanity," they insist, very properly, on a good knowledge of the anatomy and physiology of the nervous system as indispensable to a knowledge of insanity. They also, and as we think, wisely, recommend a study of what is commonly called "metaphysics," or "philosophy of the human mind." They would thus avoid the common error of physicians in general of neglecting an adequate study of the anatomy and physiology of the nervous system, and the now common error among "medical" psychologists, so called, who seldom miss an opportunity to manifest their contempt for, if not ignorance of, what has been called *metaphysics*.

The views of Dr. Carpenter as regards the general structure and modes of action of the nervous system, appear to have been accepted, on the whole, by Dr. Tuke, if not by his collaborator.

In this notice it is impossible to review with any care, in the space we have at command, the part of the work devoted to the consideration of special forms of insanity. We can only say that this part is one of the most interesting and important of all. It begins with idiocy and then proceeds to dementia, and so on to the close of this portion of the work—tubercular insanity.

This closes the contribution to it of Dr. D. H. Tuke.

The portion contributed by Dr. Bucknill opens with a chapter on the "Diagnosis of Insanity." It is, taken altogether, the most suggestive and valuable in the book. We know of no other work which contains a more practical discussiou of the diagnosis of insanity, in its medical and medico-legal relations than the one now under consideration.

The general points to be had in remembrance in the diagnosis of insanity are laid down as follows: *hereditary tendency; pre-*

vious attacks; change of habits and disposition; peculiarities of residence and dress; peculiarities of gesture and physiognomy, etc.

The "manner of examination," and the demeanor of the physician toward the patient, are discussed in a very interesting and practical way. Then follows a particular examination of the distinctive characteristics of all special forms of mental disorder, whether real or simulated. This portion of the work cannot be adequately represented in an ordinary review, no matter whether the reviewer regards the views expressed with favor or disfavor. So far as we can see at present the points made are clearly and justly taken, and we can point the enquirer to no other work in which the difficult subject of this chapter is treated, in the same space, with more practical ability than here.

The next chapter is devoted to the "Pathology of Insanity." It is to this chapter we would chiefly devote the remainder of our notice, for it is in this domain that the most striking advances have been made. In the outset Dr. Bucknill takes occasion to lay down certain general principles, which should guide the investigator in this difficult field. He says first of all what no one will dispute, and yet very few seem to remember in a practical way, that "a rational pathology must ever be founded upon the basis of physiology." As much of a truism as this may be, it is to be deplored that more physicians, even alienists, cannot be brought to act on it. It is simply pitiable to behold the amount of ignorance concerning the anatomy and physiology of the brain and nervous system in general, that prevails even where one would not at first suspect it. And yet a *rational*, and therefore a correct, pathology, most certainly awaits on this preliminary work. The key-note to Dr. Bucknill's pathological views, is to be found in the following paragraph, italicised by the author:

"*The one physiological principle upon which we have to build a system of cerebral pathology is, that mental health is dependent upon the due nutrition, stimulation and repose of the brain; that is, upon the conditions of the exhaustion and reparation; of its nerve substance being maintained in a healthy and regular state; and that mental disease results from the interruption or disturbance of these conditions.*" (Page 487.)

Dr. Bucknill says, "If we are certain of any one fact in the physiology of the nervous system, it is that nerve force is generated in or by the vesicular neurine, and that the *tubular or fibrous neurine conducts it*" (p. 487). We may admit the first part of this statement, but deny the latter part. It is not an established fact that the nerve fibres conduct *nerve force*, say as a wire conducts electricity, which would appear to be the idea of our author. Rather it seems probable that nerve force does not pass along the nerve fibres at all, but *vibrations* of some kind, such as are transmitted in solids and fluids, when they convey sound. If this is so, we cannot say that it is an established fact that the nerve fibres conduct *force*. This view which we mention seems all the more probable if we study the modes of action of the nervous apparatuses of vision and hearing.

Though the idea of the author is plain, yet we dislike, as inexact, the use of the term "sensation," which is made in the following extract, and elsewhere in the work: "But what is the nerve force of the brain? and in what manner is its vesicular neurine active? The result of its activity we know, namely, the ability to *receive sensations* of all kinds," etc. (p. 487.) Now the sensory nerve cells do not receive *sensations* at all, only sensory *impressions*, which may or may not be cognized by the sentient mind, but until they are so cognized they are not sensations. A sensation not only includes the impression made on the nervous system—the whole process from periphery to centre—but as its other half, a mental cognition, of course conscious. But Dr. Bucknill's use of the term does not include this latter part of the case at all. And in reasoning on these subjects, this looseness in the use of this capital term in the province of psychology as well as physiology, has been fraught with bad consequences in discussion.

Our author deems it of the first importance to have correct views as to the nutrition of the brain, in departures of which from a normal standard, chiefly lie, in his opinion, the conditions alike of mental health and mental disease. He says "The broad view of the production of Insanity appears to be this: The brain, like every other organ of the body, for the perfect performance of its functions requires the perfect condition of its organization, and its freedom from all pathological states whatever. Consequently, the existence of any pathological state in the organ of the mind changes its healthy functions, and produces a greater or less amount of disease of mind—*that is, of Insanity.* Such is the foundation of the Pathology of Insanity which we maintain," etc. (p. 489.)

He says, on the same page, that "experiment and observation, in our opinion, prove beyond doubt that the seat, not only of the intellectual, but also of the emotional functions of the brain, is in the convolutions of the cerebrum proper," etc.

We have no space at present in which to discuss this subject, but in our opinion the above proposition is far from having been definitely settled. We speak more particularly now as to the seat of the emotions. It seems to us just as probable that they have their seat in the great ganglionic masses at or in the base of the brain. That the intellectual faculties have, as their chief organic seat the cerebral cortex we have no reasonable doubt. But, as we have already said, the latter part of the above proposition we hold, if not open to serious doubt, to be at least far from being proved. Hence we cannot accept without some qualification the statement "that diseased conditions which affect the mental functions must have their seat in the gray matter of the cerebral convolutions."

We also object to the loose generalization, and, if so, loose analysis, that would reduce "heat, electricity, *vitality*, etc.," to the rank of mere "phenomena belonging to ordinary ponderable matter." Also, we would challenge, as having no clear basis of

fact to repose on, such passages as the following: "Alteration of chemical composition, with or without change of density, is the real groundwork of organic disease," etc. (p. 492.) Such ambiguous conceptions only encumber and never aid thought, in the discussion of pathological conditions.

Much stress is properly laid on toxic elements in the blood as a source of mental disorder. It is hardly necessary to enumerate with Dr. Bucknill the various ways in which pathological conditions of the brain may be produced, sufficiently marked to engender unhealthy mental action.

Hyperæmia of the brain, as a condition or cause of insanity, is dwelt on with emphasis, as it deserves to be.

Dr. Bucknill, speaking of the action of alcohol in the production of insanity, believes it operates by producing congestion alone. But recent researches leave but little doubt, it seems to us, that it may act directly on the anatomical elements of the brain and nervous system, wholly apart from any variations of the quantity of blood of which it may be presumed to be the cause. The two prime conditions of brain action on which insanity is believed to depend, in the judgment of our author, are the apparently contrary ones of *excitement* and *depression*. It is one of the chief objects of the remaining part of this chapter to expose the conditions on which these two states depend, and to show their presence in the different chief forms of insanity that are examined *seriatim* for this purpose.

As regards the office and importance of the cell, our author accepts the views of Virchow, as set forth in his "Cellular Pathology." In other respects he seems to follow Wedl, as regards the occurrence and significance of the changes observed *post-mortem*.

We have been somewhat astonished to find, in a work so recently re-edited, almost no mention of the influence of the vaso-motor nervous system on the vessels of the brain. This we regard as a serious omission at this day, to say the least. Again, we do not find, at least in the discussion, as much made of the point that a part of the brain may be in a strongly hyperæmic state, and hence unnaturally excited, while another part of the brain may be in a state of anæmia, and hence in a depressed state as regards action. In this way, we conceive it may often happen that one part of the brain may be unnaturally active, while other parts, the action of which may be essential to the maintenance of mental equilibrium, may be almost paralyzed. This point has not, so far as we know, been as fully examined into as it deserves to be—as it certainly is not in this work. There follows an elaborate discussion of cerebral atrophy, which is ascribed in effect to loss of balance between waste and repair, and which, in a general way, is connected with mental states characterized by depression, as regards power, and often also with morbid excitability.

"Insanity by Sympathy" is next discussed, but though the facts are fully exhibited, no serious attempt is made to explain

them. The pathological anatomy findings of the older writers are mentioned with considerable fullness, but on the whole they have but little value on account of the comparatively imperfect methods of investigation that were formerly employed. Dr. Bucknill himself does not get much nearer down toward our own times, in his pathological anatomy observations, than Guislain, Leuret, Parchappe, Griesinger, and their contemporaries. But the task of summing up the results of the latest researches in this direction is laid upon Dr. J. Batty Tuke, to whose paper we will shortly turn. The remainder of this very lengthy and well-written chapter is occupied by the author in detailing his own special pathological anatomy observations, in the course of a long experience. But we cannot tarry to notice them now.

Dr. Batty Tuke gives a brief sketch of the progress of cerebral pathological histology. He introduces a colored plate from one of Arndt's papers, exhibiting the normal microscopical appearance of the brain structure, in a section tinted with carmine and magnified two hundred and fifty diameters. He mentions the different opinions that have been entertained as to the nature of the *neuroglia*, but himself offers none.

The lesions that have been observed in the brains of the insane are grouped by Dr. Tuke as follows: 1st, of the membranes; 2d, the epithelium; 3d, the blood-vessels; 4th, neuroglia; 5th, the cells; 6th, the nerve fibres; 7th, histological appearance of special lesions, noticeable by the naked eye; 8th, the spinal cord; and finally 9th, of the sympathetic.

Dr. Tuke lays great stress on an examination of the blood-vessels of the brains of the insane, and says, "that in every case careful search will show that morbid changes take place in either one or the other of their component parts."

We believe this statement to be true. We also believe that abnormalities in the circulation in the brain are more often concerned in the production of insanity than all other immediate causes or conditions combined.

Says Dr. Tuke: "Irregular or over supply of blood to the neuroglia must result in changes in the relations to its cells and fibres, production of displacement, and consequent *impairment of their electrical relations*" (page 619). But how is the latter part of this statement known to be true, and even if true. what help is it to us in understanding the relations of diseased *structure* to diseased *action?* The statement itself is in great measure conjectural, and its utility more than doubtful. And yet its tone would lead us to expect that some important truth lurks in it.

Careful examination of the vessels when they are diseased in insanity, it is said will show the following morbid changes: "1, Thickening of one or the other of the coats; 2, a thickened condition of the sheath or hyaline membrane; 3, deposits between the adventitia and sheath; 4, proliferation and nuclei."

One of the most remarkable points observed in regard to the muscular coat of the small arteries, is that of great increase in the thick-

ness of their circular fibres, often being twice or thrice as thick or numerous as they should be in the healthy brain. What does this state imply? If the muscular fibre is normal, it implies increased work. But what is the source of this increased work on the part of the arteries of the brain? It points, doubtless, to some more or less permanent obstruction in the small vessels, probably the capillaries, to which the enlarged vessels lead. These obstructions may be various in character, as, for example, the minute embolisms described by Dr. Bastian. This state of the vessels is found especially in general paresis and epilepsy. But we cannot enter on a consideration of the important facts and inferences connected with this state of the vessels, especially as related to epilepsy.

It is hardly possible, in this notice, for us to review in detail the various morbid appearances that are mentioned by Dr. Tuke as having been made out by the different observers whose writings he has consulted, or that he has himself witnessed. Beyond those already referred to, we may mention "microscopic aneurisms, pigmentation of the arterioles, and a dilated condition of the brain surrounding the vessels."

In regard to this last point, an interesting summary is given of the researches thus far made in relation to the so-called "perivascular spaces." The conclusion is, that the evidence as to their existence is still imperfect.

Next our author turns to those morbid structural changes in which the neuroglia is supposed to play an important part. Sclerosis, in its different forms, of course comes under this head, whether general, disseminated, or miliary.

Next in order come morbid changes in brain cells, such as atrophy, pigmentary, granular, or fuscous degeneration, calcification, and hypertrophy. Then "special morbid conditions of the gray matter" are considered briefly. But as it is our intention to consider at some length these various pathological structural conditions of the brain at another time, we will not enter on their more partial consideration now. We may say, however, of this paper of Dr. Tuke, that we do not know, in the English language, of a more clear and satisfactory sketch of morbid cerebral histology than he has contributed to this volume. To this chapter is added a supplementary note of about five pages, giving a summary of the later researches of Dr. Lockhart Clarke, on the intimate structure of the cortical layer of the brain, and also a brief description and classification of the convolutions of the brain after Gratiolet, including several cuts taken from the memoir of Professor Turner on the same subject. To this note we would call the special attention of the reader.

The remainder of the volume is devoted to "The Treatment of Insanity." But we have neither time nor space to enter on this subject at present. It is our intention in the near future to consider at length the therapeutics of nervous and mental disease, at which time we may have some remarks to make on the therapeutical part of the present work.

We cannot close this somewhat hasty and imperfect notice without expressing, in no ordinary terms, the high estimation we place on this admirable manual as at present constituted. Most heartily do we commend it as one of the best works published in any language on the subject of insanity.

A work on insanity has to do with what is, in very many respects, the highest department of medicine. No other subject or range of subjects in the whole field of medical science is of more importance, not merely in its physical, but also in its social and legal bearings, and no one demands more care and skill in its treatment in a work which is to stand in any measure as an authority for others to follow in estimating and deciding the delicate and difficult questions which it involves. Such a work should embody the results of a wide experience, and extensive and accurate observation, elaborated with good judgment and superior powers of analysis and generalization. As a work possesses or lacks these requisites, and according as its author is gifted with the generous sympathy and philosophical insight that the treatment of his subject demands, in that degree does it fulfill the requirements of a perfectly satisfactory treatise.

The second work on our list meets a part of the indications we have thus pointed out. Its author, the late Dr. Thompson Dickson, was a leading alienist physician in Great Britain, and was known as an investigator and writer on subjects of mental medicine, and this book contains in a collected form the results of his own extensive experience and observation. In no slight degree it is therefore a valuable contribution to the literature of insanity, its symptoms and treatment. The circumstance of the sudden death of the author, which occurred we believe, before the book was fairly issued from the press,, gives it a melancholy interest, and in a great measure disarms unfavorable criticism. Still we cannot as honest reviewers, refrain from expressing our regret that the work has been given to the public in its present form; and, while admitting that it contains very much that is valuable and an addition to our previous knowledge, we cannot commend it as we should prefer to under the circumstances above stated. Not only does it show evidences of haste and want of care in editing, but also in places, a lack of analytic power and misappreciation of terms, that is almost painful to observe. We do not know at what stage of completion its publication rested at the time of the author's death, but from the language of the preface we may infer that it was well advanced; at all events we are compelled to say that in the matter of revision, the book deserves honest criticism, no matter whether it be the fault of the author or his friends.

The opening chapters afford more of these evidences of haste, than other parts of the book. This creates an unfavorable impression at the start, and perhaps tends to unduly prejudice the judgment. Still we find throughout the volume, not merely typographical errors, showing negligence in the proof reading, but

also, not infrequently, what seems to us a misuse of terms, awkward expressions, and occasionally we notice the employment of a barbarous or an obsolete word, showing a looseness in regard to language, and to some extent at least, a confusion in the ideas the words represent; as examples, we may quote such expressions as, "the pathology by which they are affected"; "it cognates only the disorders of the intellect"; which are perhaps among the worst. Again the author occasionally uses such a word as "unfortunably", or such obsolete or awkward terms as "governance", "discommend", etc. All these indications of lack of care or culture are particularly unfortunate in a work dealing with this special department of medicine, as it comes into comparison with the well known and admirable works of such writers as Maudsley and Blandford, and the authors of the manual first on our list. Dr. Dickson's general style also suffers by the comparison; though sufficiently clear and readable, it is by no means elegant, and is often better suited for the oral delivery in the lecture room than the printed book. It is in imaginative power that he is especially lacking: his figures and metaphors are seldom successful, and often leave a disagreeable fear that they have been brought in perfunctorily to satisfy the demands of fashion in writing, not spontaneously as the natural expression of the writer's thought. Still we had occasion in a former number to notice another English work in this specialty which presented the opposite extreme, and we must admit that the deficiencies of the volume before us in this regard, though not desirable, are infinitely preferable to the gushing exuberance of the other.

It is an ungracious task to dwell upon what may be called these minor errors of the book; we have noticed them because they seemed to us quite prominent, and calling for attention. We therefore pass to the more important subject matter of the work itself. In a notice like the present we cannot do more than review a few of the more salient points, and preferably those where the author expresses views either new or different from those most generally held by others who have written on his theme.

Dr. Dickson, like perhaps a great majority of his co-workers in this department, is clearly a somatist, regarding every manifestation of mental disorder as accompanied with a corresponding physical change in the cerebral substance, and he adopts, we think, to a greater degree than is absolutely necessary, the hypothesis of the material dependence of mental phenomena. While we have no objection to the use of a materialistic terminology, or even an exclusively materialistic treatment of the subject, since this is the aspect in which it possesses the greatest interest to the medical practitioner, we nevertheless do object to such a predominance of this bias in an author, as to induce disparaging remarks in regard to all other methods of viewing the matter, and even going so far as to object to terms that are in common use, because they seem to imply another than a purely

material signification. Neither do we see the necessity of attempting to define consciousness as the result of simple cell change, in a work like the present. It seems to us like manufacturing a material ontology, and falling into the very errors that are condemned in others. It is true, that other and abler writers than Dr. Dickson have indulged in disparagement of metaphysical studies, but we think, notwithstanding, that they are deserving of respectful consideration, and that their neglect leads to false appreciation of facts, and faulty methods.

Dr. Dickson does not recognize general paralysis as a distinct form of insanity, at least in the sense of the inter-dependence of the mental alienation and the paralytic symptoms. He maintains that either may and frequently does exist separately, and that the term "general paralysis" must be given a much wider signification than is generally allowed, including cases of mental disorder and paralysis combined, and others, where the only apparent mental deficiency is due to general failure of nerve power, and is not in any strict sense to be considered as insanity. The medico-legal bearings of this question are of very considerable importance, and the views here expressed by the author are certainly worthy of consideration. We do not doubt but that most alienists and physicians practically discriminate with care and judgment in this regard, but there is a possibility that the text-books might mislead in certain regards in the diagnosis of some cases. As to the ætiology of the affection, he holds that we have nothing definite. The theory of Blandford that it is always due to sexual excess, and the statements of others that it is produced by alcohol, are alike rejected as being unsupported by facts.

In his general remarks on the ætiology of insanity, Dr. Dickson is inclined to reject intemperance as a primary cause, deeming the tendency to excess rather as a result of the insane predisposition, and at best only as a direct exciting cause. It seems to us that in this opinion he is wrong. The evils of the abuse of alcohol, not to mention other stimulants and narcotics, are scarcely so limited in this direction. He is hardly consistent in this position, moreover, since he quotes with favor Dr. Howe's statements as to the inducing causes of imbecility and idiocy in Massachusetts, although he there qualifies his approval by saying that drunkenness itself "is *often* only a symptom of nervous degeneracy." He mentions among the possible primary causes railway traveling, and places it without reservation among the directly exciting causes in the predisposed. This has not heretofore been generally recognized among the ætiological moments of this disorder, but it is highly probable that this and many other nervous affections are at least promoted, if not indeed directly produced by it.

In his remarks on the so-called moral insanity and the moral sense, Dr. Dickson is sufficiently pronounced in his opinions. He says, "there is no abstract idea of right and wrong, unless it be that right is that which is the greatest good to the greatest num-

ber;" and again in reply to the question, have we an innate sense of right and wrong? "I think that insanity answers this question conclusively in the negative." We cannot draw his inference from his facts, nor see that his distinctions between the insane with or without the moral sense and the morally imbecile, or his illustration of the virtue of chastity, have anything to do with the questions of abstract right and wrong, of truth and falsehood for example. We have expressed our views in regard to this utilitarian theory of morals in previous reviews, and we can here only reiterate our unqualified dissent from it in all respects.

The author's remarks on treatment appear to be in the main well advised; his observations are interesting and instructive. He appears to be "well up" in the English literature of the subject, and largely so also in the foreign. Notwithstanding its defects, the specialist in insanity can derive profit from the perusal of the book.

III.—HYDROPHOBIA.

I. Hydrophobia: Means of Avoiding its Perils and Preventing its Spread, as Discussed at one of the Scientific Soirees of the Sorbonne. By H. Bouley. Translated by A. Liautard, M.D.,V.S. New York: 1874.

II. Dictionnaire Encyclopedique des Sciences Medicales. Troisieme Serie, Tome Deuxieme, Premiere Partie. Rad-Rat. Article "Rage," by H. Bouley, and "Rage chez l'Homme," by H. B. and P. B. Pp. 35 to 246. Paris: 1874.

The first of the two papers at the head of this notice, is the translation of a lecture delivered at the Sorbonne in 1868, and published in the *Revue de Cours Scientifique* for 1870, a popular rather than a thoroughly scientific presentation of a subject which, at all times and especially of late years, has engaged no small portion of public attention. As the author says, the subject, though so many centuries old, is always of interest. No other disease excites so much dread, notwithstanding that its victims are counted only by tens, while others number them by thousands. The occurrence of a single case in a community causes more consternation than even an epidemic of a less mysterious and certainly fatal disorder. It stands as to treatment as it has always stood, one of the *opprobria* of medicine; the only defence or recourse is, prevention and not cure.

It is with the praiseworthy object of informing the American public as to the phenomena and symptoms of this terrible affection, that Dr. Liautard has translated the discourse of M. Bouley, thinking with him, that the best means of prevention is, to spread information as to the signs of the disease; and to cut off, as far as possible, the chances of ignorant exposure; to eradicate the false ideas that have spread amongst the people, and which bear fruit perhaps in a great majority of the actual cases, besides greatly enhancing the terrors, and even the fatality, of other and less dangerous disorders.

But it is in the articles second on our rubric, contained in the great French encyclopedia of medicine, published under the management of Dechambre, that the fullest results of the experience, learning and observation of our author are to be found. They comprise about two hundred and ten closely printed, large octavo pages, and form, perhaps, the most thorough and exhaustive monograph upon the subject, that has as yet appeared. Certainly, of all the authors who have attempted to throw light on this mysterious disorder, M. Bouley is second to none, either in his qualifications for the task or his opportunities for extensive and accurate observation. As he states, he has for nearly thirty years given the subject his careful attention, and his connection with the veterinary schools of France, of which he now holds the position of General Inspector, has enabled him to the fullest extent to observe and study the disease. At the present time he stands, perhaps without exception, the first of living authorities on this subject.

In the memoir under consideration, M. Bouley goes over every point of the subject. After a short historical sketch of the disease, he passes at once to the consideration of the ætiology of the affection. After mentioning the saliva as the indubitable vehicle of contagion, he gives an account of the experiments of Gohier, Renault, Lafosse, Eckel, and others, as to the introduction of the poison by means of the ingestion of the flesh of animals who have died of the disease, or by the inoculation by their blood. As regards the first of these methods, he considers the question as undecided; the latter is, in his opinion, proven ineffectual. He likewise rejects the possibility by contagion from the milk, as well as the supposition advanced by a few, that it resided sometimes in the nerve tissue. He also discusses at length the questions of the liability of the different species of animals to the contagion, and their ability to transmit the disease. His conclusions are the same as those usually adopted, that most animals are more or less liable to the disorder; but, as the saliva is the principal means of spreading the contagion, only those that use their teeth are generally dangerous. The discussion of the subject is very complete, and contains nearly, if not quite all, the facts at present known in regard to the matter.

A very interesting and important section of the article is that which follows, on the question of the spontaneity of the disease

in animals. Of all the questions in regard to the disease, this is one of the most difficult, and the conclusions at which we arrive in the present actual state of our knowledge are negative rather than positive; we are able to say what is not proven better than what we know as facts. Apart from the consideration that it must primarily have had an origin from some source other than contagion, we may perhaps agree with him, that that is at present its only source as far as we can determine with positive exactitude. The uncertainties and complexities in every observation, the variable length of the period of incubation, and, especially, the mist of imagination that surrounds so many interesting facts which depend for some of their details upon unscientific and non-professional observers, make the reservation of any very positive opinion in many respects highly prudent; still, we can hardly follow M. Bouley in concluding, that contagion is probably the sole cause at the present time. The terms he uses, if we understand them correctly, rather imply almost a conviction on his part, that this must be the case. While sharing in his skepticism of all statements not absolutely proven, and allowing them, we think, their proper value, we are yet very far from arriving at any positive conclusion against the actual spontaneity of the disease in some cases; and considering the necessity, we have before mentioned, of such an origin primarily, we are not certain that we ought, in deciding this question, to give the benefit of the doubt to the negative: as in many other questions concerning this mysterious affection, a great deal more evidence than we possess at present, is required to enable us to form even an approximately correct opinion.

In the discussion of this point, M. Bouley first reviews the historical and geographical data as far as known, chiefly following the statements of Fleming, and supports his view as to the contagious origin of the disease, by arguments drawn from these facts. But such statistics in reality are never complete. Owing to the general ignorance in regard to the disease, it is more than probable, that a very large proportion of cases are never recognized as such; and except when it occurs as an epidemic, or its human fatality is large, it is not likely, in many countries, to come under the notice of medical statisticians at all. The first account, therefore, that we have of the occurrence of hydrophobia in a country, is not always coincident with its actual introduction there. For example, the northern regions of the globe are often said to be exempt, and our author quotes Erman and Steller as to its non-existence in Siberia and Kamtschatka, and refers the canine epidemic in North Greenland, described by Hayes, with doubt, to the spurious forms, though he admits that it possesses great analogies to the true canine madness. We may perhaps be allowed to offer here a personal observation bearing on this subject. In the winter of 1865–6, the writer temporarily resided at a Russian trading post on Norton Sound, near Behring Straits. During the winter and in the earlier spring months

while the temperature was still low, an epizootic, in very many respects similar to that described by Hayes, occurred among the dogs, both of the natives and the Russians. The symptoms varied in different cases; but in some they were almost identical with many of those of typical cases of hydrophobia as described —the animals changed their disposition, refused to eat, uttered a peculiar howl, foamed at the mouth, and manifested a desire to bite other dogs, though as far as observed, they never attacked their masters. It was a question among the members of our exploring party at the time, whether the disease was or was not the veritable canine madness; the facts that not all the dogs bitten seemed to suffer, and the difference of the symptoms in some cases from what we imagined were the invariable appearances, made us somewhat doubtful; and as none of us had any experience with the disease, or at the time any medical experience worth mentioning, we were scarcely competent to decide. The disease was certainly more fatal among our own hard worked dogs and those of the Esquimaux, than among the better conditioned animals belonging to the Russian posts, although we believe some of the first cases were among the latter.

The most significant fact of all, however, was the dread the Esquimaux seemed to have of the disease. Ordinarily, they would at least have utilized the skins of the slain animals, which were very valuable to them for many purposes; but in these cases they abandoned the carcasses altogether, and seemed to have a dislike to handle them or even to have their other dogs approach them. In the following summer was observed a single case which was very striking; the dog foaming at the mouth, and snapping at everything in its way, was chased down by a crowd of natives and killed with a club, and its body thrown into the sea. It was probably a strange dog, which wandered into the native camp while in the last stages of the disorder. In this case, at least, the most positive evidence was obtained, that the dangerous nature of the disorder was realized by the Esquimaux—one of them on being questioned used the most emphatic language at his command in regard to it.

The escape of some of the dogs that were bitten, if this winter epidemic was really of the nature of hydrophobia, may perhaps be accounted for by the heavy natural covering of the animal, consisting of hair several inches in length, and underneath this a dense coat of a kind of wool, which, though coarse and short in fibre, has been actually utilized in very serviceable blankets. At all events, we are at present inclined to consider the disease as occurring in Alaska, and that at a point where the natives have, perhaps, for centuries had intercourse with those of the adjoining Siberian coasts across Behring Straits every summer. If the disease is unknown in those parts, we can only say that we know no reason why it should be so, and reserve some skepticism on that point. In many parts of our own country, no case has ever occurred and been recorded; with the exception of those narrated above,

we have ourselves never seen an actual case, if indeed they were such. Then again, cases often pass unrecognized and unsuspected, and still more often unreported, even in the older countries of Europe, Prussia for example, where the complaint has been made by veterinary statisticians, that the police authorities whose duty it was, neglected to report a large number of the instances of the disease that actually occurred. We can readily imagine that in countries where medical observers are rare, authentic records of the existence or occurrence of the disorder may be wanting; and in new countries or colonies isolated from all others, like Australia or New Zealand, it may really never have existed, for the simple reason that the rare accident of its spontaneous origination has not yet taken place, and the country has so far escaped its introduction by contagion. There may be also climatic or other conditions unfavorable to the existence of the affection not yet understood, but not in any way affecting the general question of its spontaneity in certain cases.

We have, however, devoted more space to this question than is perhaps its due in a limited notice such as we can give; we have dwelt upon it because it seemed to us that the author's conclusions were rather more positive than we could ourselves admit; but we must now pass on to notice the other and not less important parts of the memoir.

The symptomatology of the disorder in the dog and other animals is described with the same thoroughness as is shown in other parts of his work. We cannot follow him here in detail—the facts given in this part of the paper are mainly not new, but it is especially valuable as giving a full resume of all that is known in regard to the matter. M. Bouley gives a number of observations from various sources which seem to indicate that the disease is not, without exception, fatal in the dog; and, crediting these, there appears at least a ray of hope as regards the treatment of the disorder in the human species. The principal trouble will be as to the correctness of the diagnosis of a case of hydrophobia in man with recovery. This, however, we shall speak of further on, when we come to notice that part which treats more especially of the disease as manifested in the human subject.

The principal facts developed by the autopsies of animals that have succumbed to this disease, are given briefly, but fully. The buccal lesions, the condition and contents of the stomach, the congestions of the lungs and brain, and all the symptoms of any diagnostic or pathological importance, are well discussed. At the time the author wrote, however, the most recent researches on the morbid histology of the nervous centres by Benedikt, Hammond, and others, had not been published, and his article does not contain, therefore, the most recent facts and theories that have been given out in regard to this particular point.

We are compelled to pass without more than mere mention, the very interesting pages which treat of the symptoms of hydrophobia as they appear in other species of animals than the dog,

and give our attention next to his remarks on the differential diagnosis of the disease.

Among the disorders that may be confounded with hydrophobia in the dog, M. Bouley mentions epilepsy, which during the attacks bears a close resemblance to it in some cases; the disturbance produced by the stoppage of a bone or other substance in the throat, the acute intestinal affections, and worms in the intestines or in the frontal sinuses. The important question whether the dog is subject to a disease or to diseases similar to hydrophobia in their symptoms, but not virulent, he does not venture to decide. All that can be said according to him is, that certain observations rather indicate that this may be the case. In this connection, he mentions the epidemic already alluded to, as described by Dr. Hayes, in the Arctic regions, and is evidently not decided in his mind as to its true nature. The distinction made by some English authors of a non-virulent rabies and hydrophobia, is not mentioned.

We wish that the author, while treating of this subject, had given us some opinion on the subject of mental aberration in dogs and other animals. We believe it does occur, and he gives an account of something of this kind in a horse, that came under his own observation. The subject seems worthy of investigation, and we would like to have the observation of so accomplished a veterinarian directed to it.

The preventive measures against the spread of the disease are next discussed. All the legal enactments that have been suggested, except the compulsory castration, are approved, but the means most efficacious in the author's opinion, is the instruction of the public as to the signs and appearances of the disease, and the eradication of the false popular ideas upon the subject. He gives, therefore, a condensed summary of all the facts that have as yet been determined in regard to it, and we wish we could reproduce this here. Our space, however, will not permit this, and we are obliged to refer our readers to the original, until such time as they may be reproduced in English, in translation, or in substance in other works.

We are compelled to pass more rapidly over the article, under a different authorship, on hydrophobia in man, and can give attention to only a few of the many interesting facts which it contains. It is more exclusively a medical subject than the other, and in some of its relations, is more interesting to the physician, but we do not, therefore, consider it of more importance. It bears to it the relation of effect to cause, and the cause is in this case not less important, and perhaps in its details, even less generally understood by the profession. In many respects, the disease in man is similar to that manifested in the lower animals; and much of what has been said in regard to them, will also apply here. The contagion by the saliva is the same, and in the dubious character of the buccal lesions, there is also a similarity. The symptoms, however, are quite different in some respects;

not more so, however, than might be expected in such different subjects of the disease. The symptom of hydrophobia which gives to the disorder its usual English name, is perhaps the most notable difference. The authors describe the different stages of the disease graphically and in detail, but we cannot follow them here.

In the remarks on diagnosis, they give some space to the consideration of the symptom of hydrophobia, as it may exist in other and often purely imaginary or hysterical disorders. This subject is, however, treated elsewhere in another volume of the *Dictionnaire*, and therefore, is not so much dwelt upon here; still they quote two observations from Barbantine and Trousseau, of a false hydrophobia succeeding the bite of a dog, and plainly due to the imagination of the patient. This, we believe, may, and does often happen; and to it are probably to be referred the cases of recovery from the developed disease that are sometimes reported. The other disorders that may be most easily confounded with the true disease, are tetanus and delirium tremens, more especially the latter, which frequently simulates it very strikingly. The remarks on diagnosis, it appears to us, might well have been extended, since so great a difference exists between the opinions of authorities; some writers having even gone so far as to deny the existence of any real disease being communicated from the dog to man, and attributing all cases to the imagination.

About six pages are given to the pathological anatomy and considerations as to the mode of action of the virus. In regard to the former, the authors conclude that only the secondary lesions of asphyxia are clearly demonstrated by the post-mortems; with respect to the latter, they hold that the poison, whatever it may be, acts principally on the medulla oblongata. They say:

"We may conclude, that although the excitation of the senses is general at the beginning of the attack, although it expresses itself by hyperæsthesia and various hallucinations; and while the convulsions may be general, the important phenomena, characteristic of the disease and those that are always associated with it, the hydrophobic and the respiratory spasm, and the expression of terror, indicate that the medulla is the part of the nervous system on which is concentrated the action of the rabid virus."

The remainder of the article is devoted to the treatment of the disease, both the prophylactic measures and the general and moral measures, to be employed after the development of the disease. Only the first of these is hopeful; immediate suction or excision of the wound, cauterization by the hot iron or concentrated sulphuric acid performed in the most thorough manner, directly after the reception of the bite, are among the most promising, and seldom fail. The general remedies advised at this stage are almost innumerable, and are alike inefficacious; only two—mercury and sweating—are considered at any length. After the disease has fairly declared itself, many remedies have

been proposed, and are noticed in this article: narcotics, baths, injections of water into the veins, hydrocyanic acid, chloroform, electricity, inoculation with serpent venom; all alike seem either useless or only very imperfect palliatives in this terrible affection. Nor does it appear probable that anything will be found in the near future, that will give us the mastery over it.

A few words are given in the conclusion of the article on the superstitious usages that have been practiced, and it closes with a classified list of the various remedies that have been advised at different times by various authors, and a very full bibliography of the subject.

IV.—DAVIS: CLINICAL LECTURES.

Clinical Lectures on various Important Diseases. Being a collection of the Clinical Lectures delivered in the Medical Wards of Mercy Hospital, Chicago. By Nathan S. Davis, A. M., M. D. Edited by Frank H. Davis, M. D. Second Edition. Philadelphia: H. C. Lea. Chicago: W. B. Keen, Cooke & Co. Pages 283.

This little work will hardly need commendation to the members of the profession, especially in the west, who as a rule are likely to receive it.

The range of subjects is necessarily limited, but those which are treated, are, practically speaking, among the most common and important in the whole list of diseases, and they are discussed in a plain and interesting manner.

No other practitioner in the west, it is probable, is more capable of discussing from a practical stand-point, the forms or phases of disease met with here, than is the author of this unpretending little volume.

Perhaps no other physician in the west has for the past twenty years, led a more active and varied a professional life, and perhaps there are few who have profited more in turning a vast experience to practical account, than has Dr. Davis.

Close and vigilant as an observer, and gifted with no ordinary readiness in the interpretation of morbid phenomena, and in appreciating morbid conditions—qualities which have been at once quickened and ripened by experience—he realizes in no small measure the ideal of the physician.

Possessed of an excellent memory, and steady reflective power, and good capacity for assimilating the results of his own experi-

ence, though not possessed of the widest knowledge of the experience of others, and earnest and determined in purpose, tireless in industry, forcible and entertaining, though diffuse as a speaker, he is peculiarly fitted to adorn the difficult position of a clinical teacher, in which sphere he has on some accounts but few, if any, superiors, in our own country.

In this little work these qualities, to those who have a personal acquaintance with its author, are exhibited in an interesting manner.

In these lectures we have, condensed, the results of long years of observation and experience, and in reading them we have been impressed as a rule, with the simplicity and clearness of the delineations of disease.

There are only a few of the lectures, the subjects of which will bring them within the scope of our journal.

Lecture XIV, is devoted to "Neuralgia"—lecture XV, to "Various Nervous Affections"—lecture XVI, to "Affections of the Brain"—lecture XVII, to "Cerebro-Spinal Disease"—and finally in lecture XIX is considered. "*Mania a Potu*, and Chronic Disease of the Brain".

We will briefly look through these lectures, with the aim of noticing any points of special interest they may contain.

The first lecture to which we will call attention, is on "neuralgia". In the course of the lecture, the pathology of neuralgia is referred to. The author says: "All cases of neuralgia may be arranged pathologically into three groups:

"First.—Such as arise from disease or injury, directly involving the trunks of one or more nerves.

"Second.—Such as arise from disease of some portion of the nervous centres.

"Third.—Such as are caused by morbid conditions of the blood, etc., etc." (P. 194.)

Inasmuch as the pathology of so large a class of diseases as the neuralgias, is of no ordinary importance, we will venture a few remarks on the views that the above extract, as well as what immediately follows, appears to contain, but especially in relation to the classification given.

The latter may be considered as exhaustive in general terms, as regards the original sources of morbid action in neuralgia. But if we correctly understand the language used, we cannot wholly agree with the views expressed. This classification would seem to make the essential seat of some neuralgias to be the nerve trunks themselves, rather than the nerve centres, with which they are connected. But though the conductibility of a nerve trunk may be modified by disease, we do not deem it possible, whatever its physical state may be, to beget a neuralgia, without the related nerve centres being the chief seat of the disorder, just as truly so as if the nerve centre had been primarily diseased. The nerve trunks themselves are not under any circumstances the seats of true sensibility, what-

ever Lewes, and other recent writers, may have said or inferred to the contrary notwithstanding. This belongs alone to the nerve centres,—nerve cells. Under any or all circumstances, whether the primary cause of the neuralgia operates on a sensory nerve trunk or at a centre, whether in the blood or not, whether physical, chemical or vital, the final and most essential step in the morbid process is a lesion of a nerve centre, always characterized by a loss of power on the one hand, and morbidly exalted sensibility on the other. Suppose we take an example of peripheral disease of a sensory nerve trunk; let it be a twig of the third division of the trifacial, or fifth pair of cranial nerves, produced by a diseased tooth. What are the more immediate steps in the process?

The peripheral extremity of a small nerve twig, such as is distributed to the interior of a tooth,—or its pulp cavity—becomes involved in irritative disease, and a continuous irritating impression is transmitted along the nerve twig, from the tooth to the few nerve cells with which its fibres are connected in the sensory nucleus or centre of the nerve. These cells, under a steady irritative discharge, become worn, excitable; their sensibility becomes highly exalted, so that even a feeble impression reaching them, gives rise to the painful sensation which constitutes the neuralgia.

The disturbance which at first involves only a few nerve cells, spreads laterally to other cells, until the whole centre may in this way become affected. Under these circumstances impressions conveyed to the centre along branches of the first or second divisions of the same nerve may, and as a matter of fact, often do give rise to neuralgic pain, not because these nerve trunks are primarily or at all involved, but because of the morbid state of the centre. Its sensibility is increased to such a degree, that even normal, and what in the healthy state would be painless impressions, give rise to pain. Instead of one tooth, all the teeth on the corresponding side, the eye, or even the side of the head, may exhibit neuralgic phenomena, all of which had its origin in the one tooth, and its corresponding nerve twig. As a proof of this, we frequently find the neuralgia disappear at once and permanently when the tooth is extracted.

Now, though this is a clear case of neuralgia produced by disease of a nerve trunk, how shall the phenomena be explained, except by going back to the centre, for the key of the explanation?

So in case of "morbid conditions of the blood"—they operate on the nerve centres chiefly, and induce in them those lesions of nutrition, whatever they may be, which constitute the essential pathological feature in neuralgia. What we object to in the above classification, is the putting some neuralgias down as due to disease of the nervous centres, while two other classes are said to belong to different categories, in which disease of the nervous centres is not the prominent feature.

But, as already said, in our view the essential seat of a neuralgia is always a nervous centre, in which the immediate pathological condition is in all cases essentially the same. This condition of a nerve centre in neuralgia, whatever it may be, we would lay down as the fundamental point to be reached by judicious analysis; and this once done and acknowledged, we would have but little or no objection to Dr. Davis' classification of the *ways* or *modes* of producing it. A better classification of the so-called causes of neuralgia, would, we think, be as follows:

First.—Neuralgias depending on excentric or peripheral causes. Chief among the causes of this class of neuralgias, would be disease or injury of the sensory nerve trunks, leading secondarily to central change as the essential condition of the neuralgia.

Second.—Neuralgias dependent on causes acting centrally or immediately on the nerve centres; these causes might be classified as follows:

a.—Causes acting indirectly through the blood either toxic or spanemic.

b.—Causes acting directly on the nerve centres, such as physical injury, or the presence of actual disease, whether hereditary or acquired.

c.—Exhaustion from overaction of the nervous centres, and its consequences. This last class of causes acting centrally, we regard as the most important of all, on some accounts. Such a mode of classification does not at least, shut out from sight in large classes of cases, the sole constant element in this troublesome form of disease.

We have deemed these remarks necessary, because they not only concern an important subject, but because too many appear not to view it in its true light.

Under the head of treatment, we do not find that stress laid on *rest* — as nearly *as possible perfect rest — physical and mental,* that we have come to look on as one of the most important items to be always remembered in the management of neuralgias. In other respects the lecture is highly suggestive and practical.

In the next lecture we have, among other subjects, that of "Spinal Irritation," so well known since its first description by B. Stilling and others.

After critically discussing a case, the following diagnosis is made: The lecturer said, "From a close investigation of his case, my opinion is, that he has chronic inflammation of the membranes of the spinal cord, along the lower third of the dorsal vertebræ, etc."

Now, the question we would raise here, is not as to the correctness of the description of the case under observation at the time, but whether it is one of what is commonly called "Spinal Irritation," as it is assumed by the lecturer to be. The description answers to what is commonly called "Meningitis," and not "Spinal Irritation," which, in the accepted usage, does not indicate

meningeal disease at all, but disease of the spinal cord itself, and not of an inflammatory or even congestive character, but, in the opinion of many, just the contrary, insomuch that the phrase "anæmia" of the cord is employed as more truly describing its pathological condition in "Spinal Irritation." An author may use terms and attach any meaning to them he pleases, but he is tacitly under obligation to employ them in the sense in which they are commonly understood, always provided they have a definite meaning. In the case under consideration the meaning of the phrase "Spinal Irritation" is so definite, and at the same time so different from that which Dr. Davis appears to give it, that we can only regard its use under the circumstances, as probably an error, that a closer proof reading would have corrected.

To anticipate a little, we would also call attention to the title of lecture XVII. It is "Cerebro-Spinal Disease." Upon reading, we find the subject of the lecture to be "Cerebro-Spinal Meningitis." It is scarcely necessary to say that, though "Cerebro-Spinal Meningitis" is a form of "Cerebro-Spinal Disease," that "Cerebro-Spinal Disease" is not "Cerebro-Spinal Meningitis" any more than are dozens of other different forms of disease comprehended under this general head. What we object to in this case is, the useless and illegitimate exchange of a specific for a generic term.

In the same lecture, in commenting on cases of hemiplegia, two points are mentioned as having an important bearing on the therapeutical management of the disorder. Though the points made are not new, yet the passage is worth quoting and remembering by all who are called to treat cases of paralysis, especially acute or recent in character.

The lecturer says: "You will notice in the early stage of paralysis, from inflammatory action especially, that hyperæsthesia will be the rule with more or less actual stiffening or rigidity in the paralyzed part. As long as these conditions exist, you are safe in acting on the rule that no benefit will be derived from the use of strychnia or the different varieties of electricity, galvanism and other stimulating agents." The remembrance of these hints, in the treatment of paralysis, as to when nerve stimulants and tonics may be profitably employed, would prevent many of the wretched mistakes that are made in the use of such agencies.

In the same lecture, on page 224, we find the following ambiguous sentence in the remarks on the pathology of locomotor ataxia. It is as follows: "The principal lesion, however, consists of an alteration in the *deposit of nerve structure* in the lower portion of the spinal cord." The lecturer feels justified, as a result of personal observation, in setting down the use of tobacco as one cause of locomotor ataxia.

As regards the internal treatment of Cerebro-Spinal Meningitis, our author has been led, by experience, to place much reliance on the tincture of calabar bean. He usually gives it in con-

nection with the fluid extract of ergot, in the proportion of one-third of a teaspoonful of the former to two-thirds of a teaspoonful of the latter to an adult, the dose to be repeated every two hours until some reason for change shall appear. At the same time, a solution of carbolic acid and tincture of gelsemium in a suitable menstruum, is given in the intervals.

We would also call attention to the general title of lecture XIX. It is "*mania a potu*," the etymological signification of which, as every one knows, is "mania from drink." The real subject of the lecture, however, is "delirium tremens." We know very well this is a customary, if not an authoritative use of the phrase *mania a potu.* Indeed upon turning to Dunglison's dictionary, we find this name given as synonymous with "delirium tremens," "dipsomania," etc. Now, what we wish to call the attention of the reader to, is the confusion in the use of terms, if not in ideas, that lurks here. By *mania a potu* and by *dipsomania,* we would be inclined to designate the mania which we observe in the case of drunkards. This mania we would divide into two kinds: 1st, Simple mania produced by excessive drink, or *mania a potu.* 2d, Mania *for* drink, such as we see in confirmed drunkards, or *dipsomania.* By *delirium tremens* we would designate the delirium that comes on, not *for*, but on *account* of excessive drink. The two are not the same by any means. The one mania may exist without delirium in the ordinary sense of that term, and in one of its forms may endure through life, and may be even transmitted as in hereditary desire for drink. The other frequently occurs as the result of an occasional "spree," and may happen in a person who has no *craving* or *mania* for alcoholic stimulants. The cases are so far different as to require separate terms for distinguishing them. We would simply call attention to the subject in passing without entering at all into the discussion which it merits. The point we would make here, it is to be observed, however, is not peculiar to Dr. Davis' book.

Before closing this brief review, we would call attention to several minor matters which, while they have but little to do with the general excellence of the book, should receive attention in a future edition.

We notice in various parts of the lectures on nervous diseases, wherever the word *neurilemma* is used, that it is spelled "neuralema," and on page 202 we find the following: "Inflammation of the neuralema, or *sheath of the sciatic nerve, etc.*" It is well known that it was formerly the custom to apply this term to the fibrous sheath of a nerve, but dating from the precise histological investigations of Robin, in regard to the structure of the fibrous investments of nerve trunks and nerve fibres, it has become the custom to limit the use of the term "neurilemma" to the so-called sheath of Schwann, which invests the ultimate nerve fibre.

We would also mention the frequent use of such expressions

as "Bromide of *Potassa*," "Iodide of *Potassa*," which though they are minor defects, yet we would be glad to see them disappear in a future edition.

Upon the whole, the work as said in the beginning, is useful, and contains, even when compared with many more pretentious volumes, hints of great practical value. We earnestly hope it may prove to be the *avant courier* of a complete work on practical medicine, which no insignificant body of the profession in the west have long and earnestly expected from the pen of Dr. Davis.

V.—HAMMOND: CLINICAL LECTURES.

CLINICAL LECTURES ON DISEASES OF THE NERVOUS SYSTEM. By Wm. A. Hammond, M.D. Reported, edited, and the histories of the cases prepared with notes, by T. M. B. Cross M.D. 8 vol. 291 pages. New York: D. Appleton & Co., 1874; Chicago: Jansen, McClurg & Co.

In this handsome volume Dr. Cross has given the medical public a series of clinical lectures delivered by Dr. Hammond at the New York State Hospital for Diseases of the Nervous System and at the Bellevue Hospital Medical College, a number of them phonographically reported, and all with the histories of the cases carefully collected and written up by himself. In doing this he has, we think, rendered a service to the student of nervous disorders that will, or ought to, be appreciated to the fullest extent.

It is not necessary to preface a notice of a work issued under the name of Dr. Hammond with any general remarks as to its authorship or its probable merits. It must be judged by itself, but we may always assume that, in whatever manner the author may handle his subject and to whatever conclusions he may give his support, a certain ability in the treatment is to be expected. And in the volume before us we are not disappointed in these expectations; although its scope is limited and the subjects are only partially dealt with, their pathological and anatomical aspects being largely omitted, in very many respects the impression it leaves is even more favorable than is given by any of the previous works of the author. It bears the hand-marks of an able teacher in the department of which it treats.

Although only a part of the diseases of the nervous system are described in this work, it will be found, as Dr. Cross says, to

contain many of the more important affections of the kind that are commonly met with in practice. The carefully prepared histories of the cases with the clinical remarks on the symptoms, diagnosis and treatment, render them even more instructive than the descriptions of the same disorders that are commonly found in text-books in this department. The object of the book is practical instruction rather than the presentation of new truths, and in the illustration of the different forms of nervous disorder which it describes it is a success. The style of both Dr. Hammond and Dr. Cross is very clear and readable : nothing, more, in fact, could be reasonably required in this respect ; and this adds very much to the comfort of the reader, and we may say also to the interest of the book.

One great advantage of published clinical lectures is that they give cases of modified or complicated disorders, such as are very frequently met with in actual practice, and do not confine themselves to simple, uncomplicated and typical instances of each form of disease such as are generally used for illustrations in text-books, and which are not, by any means, invariably observed of many nervous affections. Thus we have, in the present work, lectures on cross paralysis, active and passive cerebral congestion, posterior spinal sclerosis or locomotor ataxy, with progressive muscular atrophy, chronic basilar meningitis and others, that are seldom as fully and vividly described in general treatises on diseases of the nervous system. They are also of great advantage as illustrating methods of investigation of disease and diagnosis, points in regard to which clear, practical instruction is always desirable. For these and similar reasons a book like this is of especial value to the student, not as a substitute for, but as supplementary to the more comprehensive works.

Having said this much as to the general merits of the work, it remains for us to notice a few points with more of detail, and one or two where it seems to call for a slight criticism. Dr. Hammond does not go to any extent into the pathology of the affections he describes, though he cannot leave it altogether unconsidered in all cases. This omission is not unintentional, but is in agreement with the plan of the lecture as given in the preface, and is therefore only subject to the general criticism that, in our opinion, more attention given to this might have added to the value of the work for the purposes for which it was designed. Many of the cases recorded are of exceeding interest, but to notice them adequately would require more space than we can conveniently give. We will pass, therefore, to make a few remarks as to some of the therapeutic measures used in their management which offer some points of interest.

Dr. Hammond's treatment, in these cases, is generally simple and is always clearly described. He seems to have a great deal of faith in the efficacy of electricity in many nervous affections, and especially of the constant current, but the *rationale* of his employment of this agent is not, in all cases, made as clear as we

might desire. For instance, he employs the method of affecting the cerebral circulation in anæmia by passing the current through the head or by galvanizing the cervical sympathetic, to dilate the blood-vessels and improve the nutrition, and again, the same methods are made use of in cases of congestion for the opposite purpose of reducing the calibre of the intra-cranial vessels. In a work designed for students, and for that matter, for practitioners also, a recommendation of the same means to accomplish such directly antagonistic physiological results, might well have been accompanied with some explanatory, or at least some theoretical remarks as to its probable mode of action in these cases. If it is so applied only on empirical grounds, as in fact is very largely the case with the therapeutical use of electricity, it might be well to specify it in an instance so striking as this.

Dr. Hammond has also found the constant galvanic current, applied directly to the nervous centres, of benefit in spinal paralysis, posterior spinal sclerosis or locomotor ataxy, convulsive tremor and epilepsy. In sciatica, he also considers it directly beneficial. The method preferred is to pass the current directly through the sciatic nerve by means of needles, insulated to the point, inserted directly against its substance some two or three inches apart. The current from two or three Hill cells is usually sufficient. Generally several applications are required to effect a cure, but in several instances it has been accomplished with a single application. Both this method, and the other recommended by Dr. Hammond of the deep injection of morphia into the sciatic nerve for the relief of this affection, were fully described in Dr. Cross' paper on sciatica published in the *Psychological Journal* for August, 1874. The author also makes extensive use of galvanism in the different forms of neuralgia, and as a means of alleviating other diseases, and of course, on general principles, in the various forms of paralysis.

Of the other therapeutic measures mentioned in this volume we need only mention one or two. Dr. Hammond recommends, in congestive affections of the cord, the use of large doses of ergot, of the fluid extract, one drachm three times a day, and he has carried the dose up to two drachms. He totally rejects the commonly received opinion as to the injurious effects of ergot in producing gangrene, holding that there is not a single authentic case of this result from its medicinal use. In incipient chorea, he recommends as almost infallible, the method, first adopted we believe by Jaccoud, of applying ether spray along the spine. In the cases where he has tried it he has never seen the disease resist longer than two weeks. This he applies only at the outset of the affection, but we have known it to be of service after the disorder in its severer form had lasted for several months.

No inconsiderable part of the value of the book is due to the careful and able reports of the cases by the editor, Dr. Cross. We might, however, reasonably take exception to the anachro-

nism in the history of the case of progressive muscular atrophy related on page 147, where, by an oversight, the war of the rebellion is made to continue into the year 1867. This mistake, though not at all affecting the value of the work as a medical treatise, is unfortunate, since it is in striking contrast with the general accuracy and care in editing which it exhibits. Indeed, we meet with few works so handsomely gotten up and free from errors.

In conclusion, we can cordially recommend this volume to our readers as a valuable aid to the student and practitioner, and a real contribution to the literature of its special subject.

VI.—THOMAS: DISEASES OF WOMEN.

A Practical Treatise on the Diseases of Women. By T. Gaillard Thomas, M. D., etc. Fourth edition, thoroughly revised. 191 illustrations on wood. Philadelphia: H. C. Lea. Pages, 801. Chicago: W. B. Keen, Cooke & Co.

The author of this work certainly has reason to be gratified at the way it has been received, for he tells us in the preface to this, the fourth edition, that a former edition has been translated into the German, and the present one is to be translated into French and Italian. It would seem that a work on the subject of this one must possess peculiar merits to be counted worthy of a translation, especially into the already excellent and abundant indigenous literature of the French and German. Upon looking the work over, we think we can easily see why it should be popular. It is clear and simple in style, and in the best sense of the word practical. The arrangement is also natural, and it is especially full in the therapeutical department. In all our reading of such works as this, we know of none other in any language that has made a more favorable impression on our own mind. If there is any one point in which it is lacking in what such a manual could be reasonably expected to possess, it is in fullness in the discussion of the pathology of the diseases treated of.

In a work of this kind we would hardly look for much to be said that would bring it within the range of a journal such as ours; and this one has less than the average, so little, indeed, as regards the nervous system, its influence on diseases in women, as to be the occasion of some little surprise and disappointment to us.

Less than *one page* is given professedly to the "nervous system" (page 45) in a work of 800 pages, devoted to the "Diseases of Women."

The little more than half of a page in regard to the nervous system is devoted to a mere statement of the evil results of the systems of education prevalent in this country on the nervous system. He thinks it leads in general to precocious development of the nervous system, to the destruction of a healthy physiological balance between the nervous and other systems of the body, and to general loss of power and morbid increase of the nervous sensibilities. We can indorse heartily what little our author has said, but very much regret he has thrown away the opportunity the production of such a work afforded to speak more in detail on such an important subject.

Under the head of "Vaginismus," nothing whatever is said of the nervous aspect of the disease. It is spoken of apparently as of a purely local affection. Any such view of the case, if it is our author's, we would regard as defective, if not erroneous.

In the discussion of dysmenorrhœa, we had expected to have seen some reference to the uterine nervous apparatus, and the part it probably plays in menstruation, and in general concerning the relations to the circulation of the genital apparatus. But we do not find a word on the subject.

We only refrain now from more extended remarks under this head, because we expect, during the progress of this volume, to treat the same subject in a special article. So much, in brief, in reference to the work under consideration, from our stand-point, namely, that of the nervous system. When it reaches another edition, we earnestly hope the author may see the necessity of improving it in this important relation, or of giving some good reason for neglecting it. But in other respects we regard it as one of the plainest, most practical and sensible works on the "Diseases of Women" in any language, and worthy of being placed by the side of even so recent a work as the admirable manual of Schrœder, which has just been issued at Leipsic, as one of the volumes of Ziemssen's "Handbuch der Speciellen Pathologie und Therapie," now in course of publication.

VII.—TYSON: URINE ANALYSIS.

A Guide to the Practical Examination of the Urine. By James Tyson, M.D. Philadelphia: Lindsay & Blakiston. Chicago: Keen, Cooke & Co.

Dr. Tyson has succeeded in condensing within the comparatively narrow limits of this modest little book a considerable amount of information; it forms a very satisfactory epitome of practical urine analysis. This will recommend the work to the student and busy practitioner, who lack the time to wade through the minute de-

tails of larger works and yet desire more extended information than can be procured from the ordinary text-books, which often ignore or treat superficially many important topics that here receive the attention that is their due. Such subjects, for example, as that of the coloring matters of the urine, both in the normal and abnormal conditions, are fully and satisfactorily treated, and the remarks on this subject are among the most valuable in the book. There is in this connection a field for investigation for the student of nervous pathology, since relations exist between some of the normal coloring matters of the urine and the nervous system that have not yet been fully worked out. The chapter on urinary deposits is also very complete and will be found an extremely useful guide to the physician.

The remarks concerning the detection in the urine of the biliary acids and their clinical significance are worthy the attention of the reader. Dr. Tyson is rather emphatic in stating that both the accuracy of the tests for these acids and their importance in diagnosis have been greatly overrated.

The inaccuracy of the well-known "heat and nitric acid" test for albumen, consisting in the direct addition of strong nitric acid to a quantity of urine, followed by gradual heating of the mixture, is also made a matter of prominent notice, which should prove serviceable to those who employ this test exclusively. We remember having heard a prominent clinical lecturer declare that a patient under his care was not affected with albuminuria, since the heat and nitric acid test as applied by him had entirely failed to indicate the presence of albumen; while another portion of the same urine, when subjected to more accurate tests, showed the presence of that substance in abundance.

We are somewhat disappointed at failing to find mention of the graduated tubes for approximative, quantitative analysis, introduced by Marais and perfected by Piffard, which furnish the most ready means that has ever been placed at the disposal of the practitioner for obtaining sufficiently accurate quantitative determinations for clinical purposes. Notwithstanding this omission, we regard Dr. Tyson's manual as the best guide to practical urine-analysis for the use of students and practitioners with which we are acquainted, and can therefore confidently recommend it to the professional public. W. S. H.

VIII.—COHEN: CROUP.

Croup in its Relations to Tracheotomy. By J. Solis Cohen, M.D. Lindsay & Blakiston, Philadelphia, 1874. 78 pp. Chicago: Jansen, McClurg & Co.

Dr. Cohen has given in this paper, which was originally printed in the Transactions of the Medical Society of Pennsylvania, a

very able treatise on the subject. As it treats only of exudative and not at all of spasmodic croup, it can however hardly command an extended notice in a journal devoted to the specialty of nervous disease. The publishers have brought out the work in a handsome form, as is usually the case with their publications.

IX.—HARTSHORNE: PRACTICAL MEDICINE.

The Essentials of the Principles and Practice of Practical Medicine. A Hand-book for Students and Practitioners. By Henry Hartshorne, A.M., M.D. Fourth edition, thoroughly revised. Henry C. Lea, Philadelphia, 1874. 8vo, 548 pp. Chicago: W. B. Keen, Cooke & Co.

This condensed manual has now reached its fourth edition, and appears with considerable additions over what was included in the former ones, bringing it well up to the present state of our knowledge. As a rule we do not commend the labor-saving epitomes of medicine; the present one, however, is the best of its class and may be recommended as such. It gives in a very condensed form a large amount of useful and generally accurate information respecting the pathology, symptoms, and treatment of disease, and we doubt not it will be largely circulated, both among students and practitioners.

The Physician's Visiting List for 1875, 24th year. Lindsay & Blakiston, Philadelphia. Chicago: Keen, Cooke & Co.

This very useful and indeed almost essential little book, appears this year in its usual convenient and handsome form. It is not needful to introduce it to the profession, as we believe it is already in the hands of a majority of its members. Few medical men can afford to be without it.

Editorial Department.

WHILE we are congratulating ourselves on the handsome and deserved compliments paid to American surgery by Virchow and Mr. Erichsen—where American science and inventive mechanical ingenuity have been shown to so good advantage, we should not close our eyes to the fact, that there exists a most deplorable, not to say disheartening degree of apathy in the profession at large, toward the really scientific aspects of medicine. While the better class of American physicians are the equals, in every respect, of the better class of physicians abroad, there is yet, as a whole, as no one will intelligently deny, a lower standard of acquirement in this than in some other countries—and to a degree that need not and ought not to exist, new and comparatively crude as our institutions are or may have been. Even among respectable, and on many accounts accomplished practitioners, we sometimes hear a depreciation of scientific studies, or at least an unfavorable opinion as to their value, as compared with *practical experience*, thus sacrificing, in some measure, the best interests of scientific medicine at the point of a false antithesis. Hence it need not be a matter of surprise, when we behold, as we do daily, the laity—even the educated part of it—in following out the same idea, giving their confidence and patronage to ignorant pretenders, and in doing so answering every objection by the borrowed plea of the "practical" as against the "scientific!" The age of an unreasoning faith is still with us, so far as medicine is concerned, and no small part of the blame for this unwholesome state of things rests with the profession itself, and can only be removed by it.

We would do all honor to a wise, practical spirit, without which, even the highest attainments are comparatively unavailable; but we heartily despise the low standard of utility, which leads so many to overlook completely a luminous principle to

get at a mere prescription, and too often in much the same spirit that a cook would exhibit in looking up a new receipt.

We would not underrate the difficulties and disadvantages that medical men have had to contend against, nor the average range of intelligence and aspiration that characterizes them as a body, in the United States, but it must nevertheless be a source of regret, to every striving, thinking member, that so many, comparatively, are animated by so low a spirit in regard to the highest and best interests of the profession.

It is simply amazing to see the slightness of the value that is placed on even the plain study of anatomy, physiology, and pathology, for example—not to speak of the more refined parts of these indispensable branches of science, as they are to the physician, and nowhere is this state of things more conspicuous than in regard to the nervous system, in health and disease. And these remarks are not made as a mere threnody, inspired by personal considerations, or as the result of unfair comparisons of the profession in our own country with that of older countries, but as simple matters of fact, the full force of which, not every one has the opportunity to feel and observe.

We repeat then, that while we contemplate with pleasure the creditable achievements of individual members of the profession, we should not cease to use such examples, in every legitimate way, to stimulate the whole body of the profession to a higher style of activity, not only for personal improvement, but in lending their support to every institution or enterprise that has for its end the elevation of the profession, at least to the rank it enjoys in many foreign lands.

In the July number of the Journal for last year, in a few remarks on "The Care of the Insane," we referred, for the sake of illustration, to the legal provisions for the Insane in Washington Territory, and called attention to the abuses that were almost certain to be perpetrated under such a system as has been adopted there. We refer to this case again, to say, that

in the past few days we have received a parcel of newspapers, published in various parts of the territory, in one of which our article is printed and in all of which allusion is made to outrages charged as having been perpetrated on certain of the inmates of the hospital, which seem certainly, not only to call for inquiry, but also for an entire change in the law in relation to the care of the insane in the territory.

As regards an examination into the charges against the present management, one has already been instituted, partly at the instance of the Medical Society of the territory at its annual meeting. We hope the investigation will be made, and not only the perpetrators of the abuses complained of duly punished, but a more enlightened and stringent law enacted than the one at present in force there. But we have referred to this case chiefly, to repeat what we have said in effect before, that there is urgent need of looking more closely into the condition of our insane poor, who find their way into our city and county almshouses. We speak but the truth when we say, that though the number of such cases, as compared with the whole number of our insane, is small, yet we know of no class of persons in any of our communities, that should more earnestly engage the attention of philanthropically disposed persons, than this doubly unfortunate one of our fellow beings.

In most instances, as in that at Steilacoom, in Washington Territory, no adequate provision is made for even securing good food, not to mention really scientific moral and medical management. We shall return to this subject from time to time, and shall take pains to bring such facts to light as will emphasize the old but pitiable story of neglect and abuse of the Insane.

Partly in answer to inquiries, we may say, that the Journal will seldom appear before the 15th of the month beginning each quarter. Our subscribers and exchanges will please take note of this, and if so, will not feel surprised if the Journal does not reach them on the 1st of the month.

At the annual meeting of the New York Society of Neurology and Electrology, held Dec. 21st, the following officers were elected for the ensuing year: President, Meredith Clymer, M. D.; Vice-President, John C. Dalton, M. D.; Councillors, Austin Flint, Jr., M. D., D. B. St. John Roosa, M. D., Edward G. Loring, Jr., M. D., William H. Draper, M. D., William T. Lusk, M. D.; Corresponding Secretary, John J. Mason, M. D.; Recording Secretary and Treasurer, N. B. Emerson, M. D.; Curator, Edward G. Janeway, M. D.

Attest—Alfred L. Carroll, M. D. Sec'y.

Dr. E. S. Gaillard, of Louisville, Ky., editor of the *Richmond and Louisville Medical Journal*, and the *American Medical Weekly*, makes to the public this unusual and liberal offer: To the subscribers to the first journal, twelve handsomely engraved portraits of distinguished European and American physicians; to the subscribers to the *Weekly*, one of these portraits in each of the two volumes for 1875. The price of the first journal is $5.00 annually, and that of the last, $2.00 for the same period.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

Functions of the Brain.—At the *seance* of the Soc. de Biologie, Oct. 31 (reported in *Gaz. Med. de Paris*, Nov. 14), M. Onimus made some remarks on the memoir presented by MM. Carville and Duret to the society a short time before (see translation in first department of this number). He could not admit that the white fibres of the cerebral substance played the part of conductors of electrical currents; the nerve tube as a conducting line is one of the worst agents for the propagation of electricity that we are acquainted with. The excitation only is transmitted in this case by a kind of nervous vibration, and not by the electric current. It is the more important to recognize this distinction as it serves, in the experiments of MM. Carville and Duret, to separate the action of derived currents from the local excitation at a determinate point. But the action of the derived currents is an altogether physical matter; and it is of importance to make certain, that the derived current acts by exciting the white fibre near the point of application, and not by traversing it.

In the second place, MM. Carville and Duret, in operating on the gray substance, have obtained, as they say, paralyses of the extensor muscles of the opposite side. They therefore infer the existence of a centre for the extensors in the gray matter of the cerebrum.

But, according to M. Onimus, any mutilation whatever of the brain, intoxication and some other analogous actions, cause transient paralysis of the extensors. It is necessary therefore to be guarded in admitting, from the results of MM. Carville and Duret, the existence of a centre for the extensors, and not to designate as paralysis the momentary interruption of action that they observed in their experiments and which we can produce by any common perturbation of the nervous centres whatever, provided only it be sudden.

M. Carville, replying to the objections of M. Onimus in order, said:

(1.) It is true that it is admitted by the majority of physiologists that the white columns of the cord, like the nerves, are bad conductors of electricity. Nevertheless we think that the conductibility of the white bundles ought not to be rejected *a priori*, when we have to do with those which compose the radiant crown of Reil. In fact, in our preceding communications, we have shown that electric currents diffuse themselves throughout the brain, that they appear to follow certain fibres: for if we divide these fibres in an animal anæsthetized by chloral, the poles applied to the centres for the paws, for example, cease to produce movements. Is it the con-

ductibility that is abolished, or only the physiological communications? At present this appears to us hard to decide. Nevertheless we hold to our opinion that there is a certain conductibility of the white fibres, since when two rods of platinum in communication with a galvanometer are placed on their course it shows a very appreciable variation.

(2.) It is true that there is no permanent paralysis continuing habitually. But we do not have here to do with a mere muscular feebleness. The voluntary movements of the affected muscles appear to be totally abolished, they can only respond by reflex action. This paralysis is not persistent, it is what we have called it, a transient paralysis.

(3.) This transient paralysis cannot be attributed to a traumatism of the hemispheres in general, since it follows from experiments that we shall shortly publish, that an analogous lesion of the cortex affecting another point of the same hemisphere, causes no paralytic phenomenon, not even a transient one.

Hitzig, *Reichert and Du Bois Reymond's Archiv*, III, 1874, discusses the conditions and situation of the extra ventricular cerebral fluid of the brain.

CEREBELLUM.—P. Albertoni, *Lo Sperimentale*, June, 1874 (abstracted in *Rev. des Sci. Medicales*), gives the following results of an experiment performed at the physiological laboratory of Padua.

Among the experiments on the nervous system, the total ablation of the cerebellum of a pigeon was successfully performed. The animal survived the mutilation about six months, thus permitting the study of the phenomena of abolition of the cerebellar functions.

During the first few days after the operation, the animal seemed to be in a vertiginous condition, manifested by hesitation and disorders of all its motions. These phenomena, however, soon disappeared; and at the end of the six months, the animal was in the following condition: The organic functions were regularly accomplished; the digestion and nutrition were in general, good; the phenomena of intelligence, instinct and sensation, were altogether normal; all the disturbances were localized in the movements.

In standing, the animal supported itself on the coccygeal region, on the wings, and on the whole length of the tarsus. In walking, it used simultaneously its wings and its feet. Occasionally, it exhibited the *manege*, or circular progression. The movements of the vertebral column were normal, the cervical muscles were not paralyzed; and finally, the animal showed a general tremulousness, increased when excited by fear.

In a case of "abscess of the cerebellum," reported by Dr. Wiart, of Caen, in the *Gaz. Med. de Paris*, Nov. 23, 1874, the principal symptoms were a constant headache, finally confining itself to the occipital region, feebleness of the lower members, embarrassing not only the locomotion, but also standing, the limbs being bent on thighs while in the recumbent position. There were no disorders of sensibility nor ocular disturbances either visual or muscular, nor were there any troubles with the respiration, heart, or genitals, nor any vomiting; there was, however, before death, a slight embarrassment of

speech. The results, as a whole, are negative, as regards the cerebellar functions.

The Sense of Equilibrium.—M. Mach communicated to the Vienna Academy of Science, Jan. 22, 1874, a second note on the "appreciation of equilibrium," of which the following principal points are reported in the *Revue Scientifique*, Oct. 31:

The angular movements are perceived by the semicircular canals, and the movements of progression by the sacculi of the labyrinth. If during movement around any axis whatever, the head turns on another axis not parallel to the first, sensations are produced that are the same in the subject ive point of view, as the composite movements are in the objective.

Sympathetic Ganglia of the Bladder.—Fr. Darwin, *Quarterly Jour. of Microsc. Science* (abstracted in *Centralblatt f. d. Med. Wissensch.*), has under the direction of Klein, by means of the chloride of gold process, been able to show the existence in the urinary bladder of dogs and rabbits, of numerous sympathetic ganglia, giving out gray nerve fibres. The ganglia are frequently situated in the *adventitia* of the larger vessels, while the nerve fibres more especially accompany the arteries, and are often connected together in plexuses.

The Terminal Ventricle of the Spinal Cord. — Prof. W. Krause, *Centralblatt f. d. Med. Wissensch.* No. 48, 1874. According to the usual view, the central canal of the cord opens at the lower end of the conus medullaris into the posterior longitudinal fissure in men, and into the anterior in other mammals. In fact, however, the canal, with its epithelium, is continuous into a terminal ventricle, the fifth ventricle of the central nervous system. This is easily seen, with the naked eye, in the cross section of hardened preparations; it is 8–10 mm. long, 0.5–2, generally 0.6–1, mm. broad, 0.4–1.1 deep (from front to rear,) and ends, as may be seen with the unaided eye, in a point both above and below. This ventricle is present at all ages, but is apparently wider in children and aged persons. Sometimes it is so large, that as far back as the time of Huber (1741), it was considered a variety of nodular expansion, the purpose of which it was considered useless to seek.

The form of the terminal ventricle is, in cross section, generally that of a triangular prismatic cavity with the base of the triangle anterior; at the upper end of the ventricle, the middle of the base of this triangle becomes deeper toward the front, so that the profile of the cross section is not unlike that of a spread umbrella or a toadstool, the handle or stem of which is directed toward the longitudinal fissure. The gray substance surrounding the ventricle is almost gelatinous and contains few ganglion cells; the white columns of the cord at this height are not separated, the posterior columns are very thin. Between these last is the harder wall or roof of the ventricle covered by the pia mater and lined internally by the somewhat undeveloped ciliary

epithelium of the central canal. At its lower end the ventricle passes into the cylindrical *filum terminale.*

This terminal ventricle is also present in mammals and fishes; but it must not, however be confounded with the *sinus rhomboidalis* of birds. Whether it is to be considered as a persisting remnant of the lower end of the sinus in the embroyo of mammals is yet to be decided. Its dropsical dilatation accompanies a practically interesting form of spina bifida.

The author promises a more extended communication on the subject in the *Archiv f. Mikr. Anatomie*, Heft II.

Reflex Innervation of the Vessels of the Pia Mater.—Dr. F. Krauspe, *Virchow's Archiv*, LIX Hft. 3 and 4 (abstracted in *Rev. des Sci. Medicales*). "Only contradictory statements exist as to the reflex excitability of the vessels of the pia mater. The author has sought the solution of the question by new experiments. He employed rabbits, paralyzed by curare and kept alive by artificial respiration, the peripheral excitation being given by an induced current applied to the sciatic nerve, and the vessels observed by trephining.

"In a first series of experiments the results were absolutely negative. In spite of the most energetic excitation of the sciatic nerve it was impossible to cause the least modification in the diameter of the vessels of the pia mater accessible to the eye. Nevertheless, the author reserves his conclusions from these facts, since the opening of the skull, and the contact of the air may produce paralytic enlargement of the vessels, enough to compensate or prevent their contraction.

"These negative results might therefore be attributed either to inflammatory irritation of the pia mater, or to its independence of the sensible nerves. The author accepts the first of these alternatives, since two later experiments, performed under more favorable conditions (in two hibernating torpid rabbits whose vessels reacted very slightly to the contact of the air or to injury), were fully successful; the electric excitation of the sciatic being plainly followed by contractions of the vessels of the pia mater.

"From all the experiments the following conclusions were drawn :

1. "That the employment of narcotics, with the exception of curare, ought to be prohibited in experiments on the reflex excitability of the blood-vessels.

2. "That trepanation and the irritant effect of the air cause, in the cerebral membranes, a state of sub-inflammation that destroys the reflex excitability, and therefore interferes with the successful experimentation.

3. "That the exploration of the retinal circulation, which is not liable to the preceding causes of error, is attended with insurmountable difficulties, both in non-poisoned as well as in curarized animals.

4. "That, allowing for the numerous accessory influences that interfere with experiments and the almost insurmountable difficulties to be overcome, the author believes himself authorized to attribute a demonstrative value to two experiments alone, which, made under the most favorable conditions, showed incontestably contractions of the vessels of the pia mater."

STRUCTURE OF THE NERVE FIBRES—Dr. A. J. Lauterman, *Centralblatt f. d. Med. Wissenschaften*, No. 45, 1874, publishes the following results and conclusions from his investigations in regard to the finer structure of the white nerve fibres :

(1) The white nerve fibres of vertebrates show, at more or less regular short intervals, interruptions of the medullary envelope, which, however, ought not to be confounded with the rings of Ranvier, as they occur at much shorter intervals, besides affording a very different aspect. Their distance apart varies with the species of animals: in man the distance averages 0.008 to 0.020 mm., in frogs 0.010 to 0.040 mm.

(2) These interruptions, which appear not to involve the axis cylinder, or the layer of Schwann, divide the neurilemma into cylindrical portions, of which one extremity usually appears to be pointed and inserted into a cavity at the extremity of the adjoining piece, or both ends are pointed and so inserted. The rings described by Ranvier sometimes appear in these nerves, but at much greater intervals: they seem to me to be only a special form of the indentations I describe.

(3) Very many of these sections have still a nucleus on the inner surface of the substance of Schwann ; in the space between two of Ranvier rings there are usually several nuclei. These shorter divisions of the nerve here described, are probably the elementary divisions of the nerve fibre, and not the longer sections between the rings of Ranvier.

(4) These forms cannot be artificial, since they are seen on the living nerve as well as after the employment of reagents: coloring fluids, perosmic acid (1: 1000—1: 2000), chloroform, etc. If the nerve is ever so little damaged or destroyed in the handling, the pieces separate readily, and the axis cylinder is seen with the very thin layer of Schwann extending from one fragment to another. If any tearing, stretching, or compression is avoided, the notched points appear like thin transverse bands on the nerve fibre, to which they give a peculiar, hitherto undescribed appearance.

(5) Figures like the Latin cross as described by Ranvier, as the effect of the action of nitrate of silver solutions, occur only at the true Ranvier divisions, and not at the notches I describe.

(6) I have not seen the fibrous layer described by Schmidt, (*Monthly Micr. Journal*, May, 1874,) under the neurilemma; on the contrary, I obtained forms like those described by Stilling, as perhaps small tubes crowded together.

If one can trust the osmium preparations, I might consider these as made up of minute rod elements running in an oblique direction, but generally parallel, from the axis cylinder to the neurilemma, like the fibres that Heidenhain, among the latest, has described, in many epithelial cells. Whether these rods were hollow I could not at the time decide.

My views differ also essentially from those of Schmidt, in that he considers the indentations or notches I describe, and of which moreover I find no previous full description, or at least no adequate notice, as mere accidental folds, while I consider them as forms regularly occurring on every medullated nerve fibre.

A more complete description, with figures, is promised, to appear in a hort time.

THE ARTERIES OF THE BRAIN.—H. Duret, *Archives de Physiologie, Norm. et Pathologique*, 1874, 60–92, 316–353. (Abstracted in *Centralbl. f. d. Med. Wissensch.*)

The author first describes the arteries of the base and the great ganglia of the brain. On these depend the vascular relations of the cranial cavity. The latter part of the paper gives the circulatory processes in the cortex.

I. *Base and Ganglia of the Brain.*—The base and ganglia are supplied by branches of the circle of Willis. Commencing anteriorly, we first meet the chiasm, the anterior region of which is nourished by the anterior com. municating artery, while its hinder part is supplied by the arteria posterior communis. Both lateral portions receive auxiliaries from the interior carotid, which also sends minute branches to the beginning of the optic nerve, and with the common posterior supplies the end of the optic tract. The be ginning of the optic tract lies within the territory of the anterior choroidal artery The tuber cinereum and mammillary bodies are nourished by the common posterior. The posterior pillar of the corpus callosum, the ascending branch of the fornix, the anterior commissure and the septum draw their vessels from the common anterior. From the stem of the art. fossæ Sylvii, numerous branches start, which, after passing through the holes in the anterior perforated space, penetrate in the form of an arch, the nucleus lenticularis and inner capsule, to terminate in the corpus striatum. Duret divides these branches into two groups: an outer, (art. lenticulo-striees,) destined for part of the nucleus lenticularis and corpus striatum, and an inner division supplying the rest of the nucleus lenticularis and the inner capsule. These two groups do not anastomose with each other.

The thalamus opticus receives from the circle of Willis two arteries, an internal anterior, and an internal posterior. Both are usually branches of the common posterior.

II. *Ventricles of the Brain.*—It happens not infrequently that the above mentioned internal posterior artery of the thalamus, is given out by the arteria profund. cerebri, instead of the common posterior. This art. prof. cerebri, supplies almost all sections of the brain cavities. According to Duret, there arise from it (*a*,) an external peduncular artery, and (*b*,) an internal peduncular artery; both supply the peduncles and the substance of Sœmmering; (*c*,) a median and anterior artery for the anterior corpora quadrigemina; (*d*,) a posterior external artery for the thalamus opticus, which also generally supplies the corpora geniculata; (*e*,) an art. gyri. hippocampi for the ammonshorn; (*f*,) a posterior median and lateral choroidal artery; the last two uniting with the anterior choroidal, going from the carotid to the plexus already described, from which a part of the thalamus and the optic commissure are supplied.

In this manner all the structures of the ventricles are furnished with branches from the art. cerebri profunda. The posterior portion of the corpora quadrigemina alone forms an exception, since it receives blood from the superior cerebellar artery. The corpus striatum and the thalamus draw from two sources: on the one side from the circle of Willis, and on the other from the deep cerebral artery. In this respect Duret finds an analogy with the conditions in the gray substance of the cord. He therefore deduces the

opinion that the thalamus corresponds to the posterior cornu, and the corpus striatum to the anterior.

III.—*Cortex of the Brain.*—The anterior cerebral artery supplies with its main trunk the gyrus and sulcus rectus with the olfactory nerves, and then divides into (*a*,) an anterior internal frontal; (*b*,) a median internal frontal; and (*c*,) a posterior internal frontal artery for the corresponding portions of the brain.

The arteria fossæ Sylvii gives out four branches for the cortex, (*a*,) an inferior external frontal; (*b*,) an anterior parietal, a median parietal, and a posterior parietal artery.

The three terminal branches of the posterior cerebral, are the anterior temporal, the posterior temporal, and the occipital artery.

The author did not find any noticeable anastomosis between the arteries of the cerebral cortex.

The Color of the Chameleon.—M. Paul Bert, at the session of the Soc. de Biologie (reported in *Gaz. Med. de Paris*), communicated the following results of his researches on the phenomena of change of color of the chameleon.

A. When we dissect up a piece of the skin in the flank of a chameleon, it becomes black; excited by electricity or heat, it changes to a clear yellow.

B. When a nerve is cut, all the region innervated by it becomes black. Excitation of the nerve brings back the color.

C. If the spinal cord is severed, the region posterior to the lesion becomes black; direct irritation recalls the color: but, notwithstanding the energy of the reflex muscular acts, we cannot produce any reflex change of color.

D. If the cord is cut where it leaves the skull, all the body as far as the tip of the nose becomes black.

E. If the cord is only partially severed, the paralyzed side of the body becomes black.

F. If we remove one of the cerebral hemispheres, the animal continues to change the color of the two sides, although it has ceased to voluntarily use the members of the injured side.

G. If both hemispheres are removed, the animal takes on a clear tint, which henceforth does not change with any irritation whatever. The general reflex movements are, nevertheless, still very striking; the animal notices things, bites at the exciting instrument, etc.

H. We know from the researches of Milne-Edwards, Bruecke and Pouchet, that the skin of the chameleon contains bodies filled with black, or in some places, red, pigment matter; these bodies are composed of a deeply situated pouch, communicating with canals ramifying over the cutaneous surface. When these canals are full, the animal is black; when the matter they contain returns to the sack, the main part of the surface is of a clear, yellowish tint.

I. When we chloroform the animal, its color passes into yellow, the same as when it sleeps.

K. Curarized to the extent of stopping the respiratory movements, it becomes black; if we then irritate the sciatic nerve, we cause no muscular movements, but the skin of the part innervated becomes yellow.

L. After death, the chameleon becomes black; and after *rigor mortis* has taken place, yellowish gray.

It results from these facts:

(1.) That the chromatophorous canals are either contractile, or surrounded by contractile tissue, and that the deeply situated pouch has elastic walls.

(2.) The color-controlling nerves act by causing the canals to contract and force the pigment into the sack; their paralysis sends it back again. This explains the phenomena caused by the division of these nerves, their excitation, death, cadaveric rigidity, etc.

(3.) These nerves have much analogy with the vaso-motors, since they follow the nerves of the members and go to the head from the cervical region of the cord; also, since they have no important reflex centres in the cord which they follow with crossing; and finally, because they are not acted on by curare.

(4.) Their centre of excitation is in the encephalic ganglia, probably very near to the respiratory centre, as when under the influence of curare, chloroform, etc., the animal becomes black when it ceases to breathe.

(5.) The hemispheres act to control this centre, and to paralyze more or less completely the color-controlling nerves, whence the various tints. The reflex coloration takes place in the cerebral hemispheres. One hemisphere alone is sufficient to control the change of color on the two sides.

This influence of the hemispheres on the color-controlling nerves, separates these very notably from the vaso-motors. It explains the light color in the chameleon when under the influence of chloroform or during natural sleep.

Direct Influence of Light.—I call the attention of the Society to the following fact:

If we cut the cord of the chameleon in the dorsal region, the whole posterior portion of the body becomes black; but, if we now cover the animal with a box in such a way as to keep it in darkness, we see, on withdrawing the covering after some minutes, that the color of the paralyzed skin has become brighter, and then it deepens again under the influence of the light. We can repeat this experiment almost indefinitely.

The same thing is observed in a chloroformed chameleon or one recently killed by curare. A mere lamp, or the diffused light of a cloudy day, suffices to produce the effect.

It is, therefore, evident that light acts either on the paralyzed canals or on the nerves. In either case, it acts by diminishing the contraction of the canals; it acts by paralyzing, and not by exciting.

ACTION OF ELECTRICITY ON THE SPECIAL SENSES.—At the meeting of the Acad. des Sciences de Paris, November 9th, (abstracted in *Rev. Scientifique*,) M. Phipson reported some experiments on the action of electricity on the specials enses. It resulted from these experiments, that the action of the

galvanic current on the organs of sense is always pronounced at the positive pole, except at the moment when the negative becomes in its turn positive, and then an action takes place at that pole. M. Phipson thinks further, that he can find in these facts an indication of a general law, applying equally to the muscular contractions occasioned by electricity, and very probably to the interesting phenomena of induction.

If we take a small zinc copper pair, plunge it into the acidulated water, and furnish it with platinum rheophores, and place the zinc pole first on one side of the tongue, and then the copper pole on the other side, we notice at that instant a particular taste, which is felt at the point touched by the copper pole and never at the other. Changing the position of the poles, we repeat the experiment with always the same result: the taste is felt at the copper pole, and never at the other. If now we substitute a stronger pair, we still invariably experience the sensation of the galvanic taste at the point where and the instant when we apply the copper pole, but we also observe the other fact, that when we lift off the copper, the taste exhibits itself at the zinc pole.

Similar phenomena manifest themselves when we experiment on the organs of sight, hearing or smell.

The essential point insisted on by M. Phipson, is that when we study the action of the galvanic current on the organs of sense, we observe that the current propagates itself only in one manner, that is, from the positive to the negative pole, and that the action on the organ always takes place at the positive pole; but as we have seen, the positive is sometimes the copper and sometimes the zinc pole.

THE following papers have also recently appeared on the Anatomy and Physiology of the Nervous System:

ARNDT, Investigation on the Ganglion Cells of the Spinal Ganglia, *Schultze's Archiv*, XI, 140, 1874; SCHŒN, On the Sense of Color, *Berliner Klin. Wochenschrift*, Nos. 29 and 30; STARK, On the Motor Centres in the Cortex of the Anterior Central Convolution, *Berliner Klin. Wochenschrift*, No. 33; CLIFFORD ALBUTT, On the Influence of the Nervous System, and of Arsenic on the Nutrition of the Skin, *Practitioner*, Nov.; ERNST REMAK, On the Vicarious Function of the Peripheral Nerves in Man, *Berliner Klin. Wochenschrift*, No. 48; HUGUENIN, Some points in the Anatomy of the Brain, *Archiv f. Psychiatrie*, V, Hft. 1; NUEL, On the Influence of Irritation of the Vagus on the Heart Contractions in the Frog, *Pflueger's Archiv*, IX, III and IV Hft.; FRENSBERG, Reflex Movements in Dogs, *Pflueger's Archiv*, IX, VII Hft; MASON, The Polar Action of Electricity in Physiology, *N. Y. Med. Jour.*, December; VEDIE, Observations relative to the Functions of the Corpus Striatum, *Ann. Med. Psychologiques*, May, 1874; BADAUD, The Influence of the Brain on the Arterial Blood-Pressure in the Lungs, *Verhandl. der Phys. Med. Gesellschaft in Wurzburg*, Neue Folge, VIII, I and II Hft., 1874; ONIMUS, Difference in the Action of Induced and Continuous Currents on the Economy, *Robin's Jour.*, Nov. and Dec., 1874.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

Morbid Histology of the Brain.—The *Edinburgh Med. Journal* for December, contains a review of the fourth volume of the *West Riding Lun. Asyl. Med. Reports*, London, 1874, not as yet received by us, from which we extract the following:

Mr. Herbert C. Major contributes some observations on the Histology of the Morbid Brain. Although his paper bears the evidence of careful work, the author rises above the encumbrance of details, and presents his conclusions in a form which enlists attention. His observations are illustrated by three wood engravings. We copy the following conclusions which he has worked out :

1. That in senile atrophy of the brain, the nerve cells throughout the entire depth of the cortical layer, and in all parts are morbidly affected, although to a variable extent and in a different manner.

2. That in the large nerve cells the morbid process in the great majority of cases is one of granular degeneration.

3. That in the smaller nerve cells generally, and occasionally also, but rarely in the large, the process is one of simple atrophy, without granular degeneration properly so called.

4. That the nuclei of the cells invariably participate in the diseased condition, and become the seats of granular deposits, which lead ultimately to their destruction.

5. That at an early period the branches of the large cells are usually atrophied and destroyed to a greater or less extent, but exceptionally are retained up to a late period in the degenerative process.

6. That the condition of so-called hypertrophy of the cells (Rutherford, Tuke,) depends on a peculiar transformation of some of the large pyramidal bodies, and is not confined to senile atrophy, being also observed in general paralysis, but in both is of exceptional occurrence.

The most common alteration in the vessels is a condition of dilatation. The nerve fibres were generally found abnormally coarse and tortuous, and the neuroglia in a state of atrophy and degeneration.

Disorders of the Optic Nerve in the Cerebral Affections of Children.—Hock, *Oesterr. Jahrb. f. Pædiatrik* (abstracted in *Deutsche Klinik*, No. 42, 1874), disputes the claims of Bouchut as to the priority of thé discovery of the connection between Optic Nerve Disorders and Brain Affections. While it must be acknowledged that Bouchut first called attention to the very frequent occurrence of this affection in children, it can also be proved that several German authors described this complication before Bouchut, and first of all von Graefe has made it a study, and has described it with even more clearness and thoroughness than the French author. He distinguishes two forms of trouble of the optic nerve in cerebral affections. One of these

to which he has given the name "Stauungs Papilla", consists in an obscuration and reddening of the disc and its surroundings, with dilatation of the veins, and contraction of the arteries; the affection only involves the innermost layer of the retina, and does not overstep in a centripetal direction the point of entrance of the nerve into the eye. The second form consists in a descending inflammatory process in the optic nerve, finally affecting the retina. While the first of these conditions, according to Graefe's opinion, accompanies an affection crowding or expanding the contents of the cranial cavity, the other indicates an inflammation of some intracranial organ. Both forms, in cases of long duration, may pass into atrophy of the optic nerve. These views of Graefe have been in part shown to be untenable by the researches of other investigators, and Hock collects together the following seven propositions as comprising what is at present positively known upon the subject.

(1) There is one form of disorder of the optic nerve which depends on an increase of the intracranial pressure, and which manifests itself by simple swelling of the papilla, the visual power usually remaining intact, being frequently accompanied with dropsy of the sheath of the optic nerve, and it may perhaps be due to this condition.

(2) This form often passes into actual inflammation of the nerve and the neighboring portions of the retina.

(3) There are sometimes cases of meningitis and encephalitis, with true descending neuritis.

(4) In some instances simple atrophy of the optic nerve occurs from increase of the intracranial pressure, without previous swelling or inflammation, but in these direct compression of the nerve by a tumor is generally the cause.

(5) There can be scarcely any intra-ocular neuritis without involvement of the optic nerve stem.

(6) Inflammation of the retina and swelling of the papilla may also possibly be brought about in cerebral affections by the intervention of vaso-motor nerves.

(7) The eyes of children are liable in much greater proportion than those of adults, to disorders of the optic nerve in cases of brain disease.

The author brings forward some twenty observations to confirm the above propositions.

Precocious Secondary Traumatic Neuralgias.—M. Verneuil read a paper at the Lille meeting of the French Association, (reported in the *Gaz. Medicale de Paris*,) in which he gave this name to those more or less intense pains felt the first days succeeding a wound or an operation, and located either in the lesion itself or its neighborhood, and radiating sometimes for a considerable distance. These pains have a neuralgic character; they follow sometimes, but not constantly an intermittent or remittent course; they are resistent to treatment by narcotics or antiphlogistics, and frequently yield with an astonishing facility to the sulphate of quinine.

Usually the muscles and the vessels of the region of the injury undergo

functional disturbances, such as contractions, tremor, and subsultus of the muscles, exaggerated pulsation, and even hæmorrhages of the vessels.

M. Verneuil selected among numerous observations three cases of which he gives the details.

The first was a case of contusion of the breast, followed by the usual painful sensations, which disappeared after a moderate length of time, and then reappeared without any ostensible cause, and took on a periodic character. After having employed narcotics both externally and internally without effect, he had recourse to quinine, which caused an immediate cure.

In the second case he performed an operation for the removal of a tumor. After the first few days neuralgic pains made their appearance. No result followed the use of anodynes, but sulphate of quinine caused a cure.

The third case is more remarkable; it occurred in a subject suffering from a wound caused by a military projectile. After some days of expectation, severe pains with erysipelatous swelling appeared in the whole wounded limb, the wound took on a sanious aspect, and the general condition was most unsatisfactory. Amputation was decided upon, but with small hope of success. The operation was delayed however one day, in order to try the effects of quinine. Hardly had this medication been begun, when all the unfavorable symptoms disappeared, the patient recovered, having saved his leg, from which there were removed only a few splinters.

M. Verneuil's paper and observations are given in full in the *Archives Generale de Medicine*, Nov. and Dec., 1874.

PERTUSSIS.—Dr. Vannebroucq, in a paper read before the medical section of the French Association, at Lille, Aug. 26th, (abstracted in *Gaz. Med. de Paris*) contested the neurotic character of whooping-cough, and held that the phlegmasic lesions sufficed to explain the nature and progress of the disease. These lesions occur in the ventricles of the larynx, and it is there that they are most persistent, although they may extend to the ramifications of the bronchii. According to M. Vannebroucq, the muco-purulent secretion of the laryngeal ventricles, falling suddenly into the larynx, causes the spasms of coughing, and their consequent expectoration. The treatment he recommends consisted in the use of belladonna and bromide of potassium, which weakened the exaggerated sensibility of the pharynx and larynx, and the aspiration of the vapor of water containing 1-300 of phenic acid, or 1-100 of chloral.

HÆMATEMESIS IN HYSTERIA.—Dr. Louis Ferran, *brochure*, Paris, 1874, (abstracted in *Gaz. des Hopitaux*) concludes from his studies of the subject, that vomiting of blood cannot always be considered as indicating organic gastric lesions, but that in certain cases, with general symptoms altogether nervous, and particularly in cases of hysteria, hæmatemesis occurs under circumstances which enable us to exclude all such accidents. It is the same with this phenomenon as with the hæmatodroses, and the other hæmorrhages observed in hysterical subjects.

Paralysis of the Radial Nerve.—We copy from the *Progres Medicale* the following notice, by Landauzy, of a recent memoir, by M. L. Chapoy, issued in Paris during the past year.

"The author, after having given a complete history of the question, and indicated in detail the French and foreign bibliography, studies with great care the causes of paralysis of the radial nerve. These causes are predisposing and occasional: there is, among these last, one which has merited the attention of the author the more, inasmuch as it has been recently doubted in a very remarkable paper by M. Panas. Dr. Chapoy, after refuting the objections of the surgeon of Lariboisiere, and publishing five indisputable observations of paralysis *a frigore*, makes cold to play a very important part in the production of radial *akinesia.* The study of the symptomatology, considering both the period of the commencement as well as that after it has become confirmed, follows that of the causes.

This part of the work, clearly and carefully written, ends with an account of experiments performed with the object of examining the condition of the muscular contractility after compression of the nerves. From these experiments the author concludes that this compression (in the dog and Guinea-pig) does not always produce paralysis; and that the sensibility may be either normal, diminished, or exaggerated, and, finally, that the electro-muscular contractility is always diminished.

The details given by Dr. Chapoy of the symptomatology render the diagnosis of radial paralysis easy; and the author passes rapidly over the muscular atrophy and the contraction of the flexors, to occupy himself with the diagnosis of the cause of the condition.

This cause is revealed by electric exploration; the preservation of the electro-muscular excitability observed in paralysis due to cold, is wanting in the traumatic paralyses.

The treatment is divided into two classes, preventive and curative. In the first of these two we should avoid (1) the causes of chilling the nerve, (not to allow the arm to be uncovered during sleep) and (2) all causes of compression (like crutches with only one upright, and unpadded cross pieces).

The curative treatment comprises the application of electricity; faradization may be employed in the paralysis from cold; galvanization is preferable in traumatic cases, since besides awaking the excitability of the nerve and muscle, it is efficacious against the possible atrophy of the latter.

Some details, taken from Duchenne's work, on the points of selection for localized electrization of the paralyzed muscles, and in regard to the precautions to be exercised against the tonicity and retraction of the flexors when the paralysis has become incurable, terminate this useful memoir, in which the physician will find all the particulars requisite to enable him to recognize and treat properly an affection the more interesting as it is so often encountered.

Asthma.—The following are the conclusions of a paper by Prof. Biermer, of Zurich, translated in the *Archives Generales de Medecine*, Oct., 1874.

Bronchial asthma consists in a tonic spasm of the bronchial muscles.

This fact is demonstrated by clinical proofs, notably by the respiratory type, the sounds of stenosis, and their rapid disappearance after the administration of chloral.

The bronchial spasm causes acute pulmonary emphysema and depression of the diaphragm.

This acute emphysema, which must not be confounded with the true emphysema, is produced whenever the bronchials are contracted by spasm or bronchitis, with unimpeded respiration.

The alveolar ventilation is easily obstructed by the obstacles in the bronchii; the air enters the alveoli more easily than it leaves them.

In the bronchial spasm the obstacles are more pronounced to expiration than to inspiration.

The alveolar distention reveals itself by a modification of the resonance to percussion, and by displacement of the diaphragm.

The symptoms of spasm of the diaphragm differ from those of asthma. The former cannot continue for hours without producing asphyxia.

Clonic spasm of the diaphragm is accompanied with a kind of sobbing noise, and especially affects the inspiration. In bronchial asthma, on the contrary, the expiration is the most embarrassed. The expiratory dyspnœa is as characteristic of contraction of the finer bronchii as the inspiratory form is of that of the larger tubes. When the lung fills itself with difficulty it is the inspiration that is forced; when it is distended, on the other hand, the expiration is exaggerated. Croup and laryngeal asthma, are the types of inspiratory dyspnœa.

Bronchial asthma is almost always of reflex nature.

We may distinguish an idiopathic or essential bronchial asthma and a catarrhal form. Both are accompanied with congestion of the mucous membrane of the respiratory passages. There are, nevertheless, cases or attacks of asthma which offer no symptoms indicating bronchial congestion or catarrh.

Asthma in Children.—The rarity of nervous asthma in children has led many authors to deny its existence at that period of life. Politzer was one of the first to describe this neurosis, of which he has related five very interesting cases. The observation published by Dr. Guastalla (*Jahrb. f. Kinderheilk.* III, 2, 210,213, 1874), is the more noteworthy since it appears to us to be an undeniable example of asthma, purely nervous and independent of any lesion of the respiratory passages, of any bronchial adenopathy or cardiac affection. This case alone is sufficient to establish to him the independence of this affection, and its occurrence at a very early age.

He had to treat a little girl seven years of age, the child of asthmatic parents, who, from the age of one year and a half, suffered from attacks of asthma, at first light, then increasing in intensity and duration. During its third year they occurred every six weeks, and later every month, each attack lasting about two days. When four years old the child had only rare and very transient attacks, and during the following ten months they failed entirely, so that the parents believed that a complete cure had been obtained,

when a new attack occurred, more violent than the preceding ones, but which like them disappeared without leaving any bad effects.

Alterations of the Spinal and Sympathetic Ganglionary Systems.—P. Foa, *Revista Clinica*, Feb., 1874 (abstracted in *Rev. des Sci. Medicales*).

In a case of amyloid degeneration of the spleen, liver, kidneys and lymphatics, the author found the tunics of the small arteries in the cœliac ganglia infiltrated with a lardaceous appearing matter, which gave the reaction of an amyloid substance.

In tuberculous subjects he found the cœliac ganglion infiltrated with white globules. Between the nervous fibres that formed the ganglion there were a number of little colorless cells formed of a nucleus, surrounded by protoplasm. These, according to the author, are the result of an irritative process, and are not peculiar to tuberculosis.

In an individual who had suffered from cardiac lesions, with the cœliac ganglion reddened and twice its usual size, the intra-ganglionic veins were varicose and full of red globules. The nervous cells were filled with pigment. Many groups of cells were surrounded with white globules, and in places the nuclei of the endothelial cells were covered with brownish granulations; besides, the capsule was distended by the presence of white globules situated within the capsule and the nervous cell.

An anasarcous subject presented alterations similar to the above, corresponding to the embarrassment of the ganglionary circulation which reveals itself by congestion, varices, and sclerosis of the ganglion.

In a case of cirrhosis of the liver, with biliary stasis, the protoplasm of the ganglion cells was infiltrated with a yellowish fatty matter, while the nucleus was red and granular.

Two observations showed that the age of the subject modified these conditions. There follow two cases of alteration of the ganglia of the spinal nerves. The first of these was in an old woman dead from tuberculous pneumonia of the apex. In this case the first four intercostal nerves were very large, their envelopes were hypertrophied. Among the ganglion cells some were charged with pigment, others were covered with yellow granulations ; it was a case of fatty degeneration.

The other case was that of an individual affected with bilateral diffuse tuberculosis of the lungs. The very much enlarged cells were covered by yellow granulations, or by pigment mingled with reddish globules. The nerve fibres were healthy.

The author promises to continue these interesting researches, which were made in the laboratory of Prof. Sangalli, at Pavia.

Farado-Muscular and Galvano-Muscular Contractility. — M. Onimus presented to the Soc. de Biologie, Oct. 25, 1874, (abstracted in *Revue Scientifique*) the following observations on this subject: He had had occasion to observe, ten days after the accident, a young girl who, in consequence of a fall, suffered from complete paralysis of the right facial nerve. The muscles

still reacted a little to faradic electrization, and it was only on the twenty-second day after the accident that they remained altogether impassive to induced currents. In facial paralysis from cold, on the other hand, all the muscles are attacked at the same time and very rapidly ; on the third day we often observe a diminution of the contractility to induced currents.

When, in place of a traumatism, the nerve is compressed, or injured in its course, or even within the skull, these phenomena of differences of contractility appear still more slowly and gradually.

In a patient, in the service of M. Charcot, who died in consequence of determinate lesions of the nervous centres, M. Onimus observed this gradual disappearance of the faradic contractility, and the increase of contractility to the galvanic current. The paralysis of the facial muscles of the right side appeared Feb. 12; at the end of the month the farado-muscular contractility was enfeebled, though not yet abolished. It was only in the early part of March that the paralyzed muscles lost almost entirely their faradic contractility, while they responded, on the contrary, more readily than the sound muscles to the galvanic current. At the autopsy there was found at the base of the brain scattered gray patches, and the facial nerve of the right side was more gray than that of the left. The facial paralysis, therefore, in this case was the result of an alteration of the nerve at its origin, which extended itself gradually as far as its intra-muscular terminations.

M. Onimus concludes from these facts, that to obtain the abolition of the farado-muscular and the augmentation of the galvano-muscular contractility, the two following causes must simultaneously exist : (1) An alteration of the intra-muscular nervous filaments; and (2) the absence of any profound alteration of the muscular fibres.

Puerperal Eclampsia.—Dr. Sarronville, *Gaz. Med. de Paris*, Nov. 28, reports four cases of puerperal eclampsia, and closes his communication with the following remarks :

The analyses of MM. Andral and Gavarret have long since shown that the various accidents observed in the pregnant female are generally connected with diminution in the number of the blood globules (hypoglobulie).

This *hypoglobulie*, resulting from the state of gestation, besides the symptoms that habitually accompany chloro-anæmia, occasionally induces, in the later months of pregnancy, attacks of puerperal eclampsia. But these cases are rare, since convulsions are hardly ever observed except in women suffering from albuminuria. And although albuminuria, so frequent in pregnancy, may be far from being usually followed by this terrible complication, we still cannot deny that it is yet the principal predisposing cause of it, from the changes which it brings about in the composition of the blood.

We may suppose, in fact, that the nutritive fluid, modified in its constituent elements by the decrease in the number of its globules, and probably vitiated in its composition by the presence of a certain proportion of urea in the circulation at the same time that it has partly lost its nutritive properties, may cause in the anæmic nervous centres a state of super-excitability, which, rendering them more susceptible to external excitations, makes these latter a

point of departure, in a reflex manner, for the convulsive phenomena of puerperal eclampsia.

Hence follow, in a therapeutic point of view, certain precise indications on which it may be useful to dwell.

Puerperal eclampsia is observed sometimes during the later months of pregnancy, sometimes during labor, or even at a period more or less distant after delivery. I will only pay attention in this communication to the first two.

When we meet with a case of eclampsia not at term, no matter whether she be albuminuric or not, though we know that albuminuria is present in the great majority of cases, it is needful to remember that we have to do with a chloro-anæmic, and that, further, we have to combat nervous accidents following uræmia and anæmia of the cerebro-spinal centres. We should, therefore, while we apply a ferruginous and tonic treatment, also prescribe the proper medicines to reduce the excitability of the nervous centres. I give the preference in this case to the bromide of potash, which I rapidly carry up to slightly elevated doses. I do not doubt that if pregnancy be not too far advanced, and if there is sufficient time, the results will justify this treatment.

It is needful to remember that the attack of eclampsia is most frequently only a reflex phenomenon, and if we can diminish the excited motor power of the cord and bulb, we will have greater chances to see the pregnancy follow its course, and to prevent convulsive accidents during labor.

If called to a woman at term, the conduct of the physician should vary according as the labor is more or less advanced.

If the os is sufficiently dilated or dilatable, no hesitation is possible, since it is prescribed in this case to terminate the accouchement as soon as possible, either by version or the forceps.

But if the convulsions have surprised the patient during the first pains, and if we then find the dilatation of the os barely begun, if each pain, occurring very frequently, produces an eclamptic spasm which prevents its dilatation, what then are we to do ?

Is it necessary, as has been and is yet practised, too often perhaps, to bleed the patient, and repeat the operation many times, with the end to prevent the cerebral congestion ? I do not think so. I consider, on the other hand, that this treatment will most generally be at least irrational. Examples of plethora during gestation are very rare ; in reality, anæmia almost always accompanies the pregnant condition. And if we take into account that it is far from being demonstrated that the super-excitability of the nervous centres is a result of a congestive state, while it is incontestable that during the tetanic stage of the attack, there is produced, without exception, in consequence of the arrest of the respiration, an active congestion of the brain which increases with the number and frequency of the attacks. We should think, therefore, that instead of attempting to enfeeble an already anæmic patient, by bleedings of dubious propriety, the physician ought without delay, to have recourse to heroic agencies to bring about a rapid sedation of the nervous centres, and prevent or obstruct the attacks which are the real cause of the congestion. In such circumstances, bleeding, save, with rare conditions, appears to me to be proscribed, and although it may be

deemed beneficial to diminish an already existing congestion, by recourse to local abstractions of blood, I think it especially needful to prescribe bromide of potassium and chloral without delay, either by the mouth or rectum, and not to hesitate, in case these agents appear insufficient to arrest the attacks, to submit the patient to the influence of chloroform until the delivery is accomplished, which should be as soon as possible.

Classification of Insanity.—We copy the following notice of a *brochure* by Dy Dr. P. Berthier, from *L'Union Médicale*, Sept. 1, 1874:

Honest but despairing! M. Berthier, the resident physician of the hospital of the Bicetre, and consequently very familiar with mental maladies, declares that in the actual state of our knowledge, it is impossible to classify these affections, either on the basis of anatomy, physiology, pathology, symptomatology, or psychology.

Anatomy is almost mute as regards the organic conditions of the psychoses.

Physiology is unable to say how the insane man differs from the sane in the play of his psycho-cerebral mechanism.

Pathology, which unites in the same group subjects analogous only in appearance or in a single aspect, gives us an arbitrary, that is, an artificial classification.

Ætiology, with seducing promises, offers only deceptions and prolixity.

Symptomatology can only place a few landmarks on the route.

Psychology has not as yet been able to fix in the mental being the lines of demarcation between its parts, unappreciable by the senses.

There remains, therefore, the clinical analysis, which, according to M. Berthier, is alone able to establish a classification of mental disorders. These last it groups in the following sections:

1. The delirium may be only an accident in the ordinary pathology, like the accessory delirium which develops itself in the fevers, phlegmasias, etc.

2. The delirium may be allied to general or local morbid conditions, epileptic, paralytic, choreic, puerperal insanity, etc.

3. The delirium may be independent, existing in itself, possessing fundamental characters which can change only of themselves. We have then:

Teratomania—Indigence, or native rarity of ideas, nullity or puerility of sentiments, weakness or passive obstinacy of the will (*Folie monstreuse*).

Zoomania—Obtuseness or acquired poverty of ideas, frivolity or acuteness of the sentiments, effacement or vacillation of the will (*Folie bestiale*).

Holomania—Instability with precipitation and exuberance of ideas, anarchy of the will (*Folie generale*).

Plexomania—Confusion and obscurity of ideas, anxious perplexity of sentiments, oppression of the will (*Folie stupide*).

Logomania—Delirium fixed, but logical in ideas, change of feelings, obsession of the volition (*Folie raisonnee*).

Physiomania—Sudden eclipse of reason, temporary obscuration of the feelings, automatism of the will (*Folie instinctive*).

Stoechiomania—Eccentricity or apparently plausible exaltation of ideas, versatility with perversion of sentiments, aggressive and whimsical predominance of the will (*Folie rudimentaire*).

Polymania (*Folie composite*).

We find this classification, proposed by M. Berthier, still further detailed and sustained in a thesis of one of his students, Dr. Emile Calmette, "De la Valeur des Symptomes en Pathologie Mentale" (Paris, 1874, 8vo 40pp). From this thesis, remarkable in more than one respect, we extract the following passage:

"In our country, where advocates of every kind have often too much freedom, it is not uncommon to see men unacquainted with medicine venturing to decide the most difficult and delicate questions of mental alienation by a single affirmation. There is not, perhaps, a single domain of science the study of which is more difficult and arduous and which needs a longer experience. So Prof. Tardieu, in his "Etude Medico-legale de la Folie," affirmed, in the eloquent style peculiar to him. 'I hold,' says he, 'that the physician, placed before an insane person, cannot conscientiously pronounce as to his mental condition, and that if he were able to assign him a place in mental disorders, and if he desired to confirm his opinion in the minds of those who ask his advice, he must of necessity furnish them with the proofs from medical observation, and not indecisive formulæ, as useless for the purposes of justice as they are unworthy of science.' These proofs, drawn from medical observation, can, we believe, be furnished in the present state of our knowledge, only from clinical investigation, by the aid of classification based on the alteration of our elementary faculties, and the clear appreciation of the symptoms presented by the patient."

CHRONIC MENINGITIS.—E. Leudet, *Clinique Medicale de l' Hotel Dieu de Rouen* (*Schmidt's Jahrbucher*, *No.* 8, 1874).

The most frequent causes of chronic meningitis are the abuse of spirituous liquors, tuberculosis and syphilis. This chronic inflammation is developed in the drunkard probably in consequence of the so commonly occurring disorder in such cases, of the cerebral arteries. A similar condition is present in many cases of constitutional syphilis, according to the researches of Clifford Albutt, Passavant, and Heubner. The arterial walls become thickened, spontaneous coagulation of the contained blood occurs, and there results anæmia and death of a more or less extensive portion of the brain substance, and a collateral congestion in its surroundings. Perhaps the alterations in the arteries may be of a secondary nature, their contraction and the coagulation being due to thickening of the membranes of the brain, but in either case the final result is the same. Chronic meningitis may be latent during a great part of its duration; sometimes it may be entirely overlooked, since the functional disturbances it causes are very slight.

As to the time of the commencement of the disease, it has been observed that in syphilis the meninges in many cases are the seat of chronic inflammation in a few (three) months after the primary infection, and also at the time when the so-called secondary symptoms make their appearance; two cases of the author's are given in evidence. In drinkers the disease usually first

manifests itself at an advanced stage of the alcohol dyscrasia, in some patients early, in others later. In tuberculosis, finally, the exact time of the onset of the meningitis is still undetermined. In three cases the author saw the cerebral precede the pulmonary symptoms; still, such things are observed only in children, never in adults. Inflammation of the membranes of the brain and spinal cord may have a two-fold cause in tuberculosis : on the one hand it may develop under the influence of the prevailing inflammatory conditions, or it may be connected with a tuberculous deposit in the membranes themselves.

The symptoms of chronic meningitis are well known. In that form which is the result of syphilis or tuberculosis, the intelligence does not at all partake, while severe and extensive disturbances of motility and especially of the sensibility are present. In other cases the nervous symptoms point to the splanchnic nerves (in one of the author's patients there were repeated attacks of enteralgia), or to the vaso-motor nerves, and there simultaneously or alternately appear in the same part of the body, abnormal conditions of motility or sensibility and herpetic eruptions limited to the track of the nerves. We may also remark that inflammation of the cerebral envelopes gradually extends itself, and that it may exhibit exacerbations and remissions. This variation in the intensity of the phenomena is particularly pronounced in the motor portion; we see, for example, a paralysis now increasing and then again disappearing, disappearing in one locality and becoming apparent in another.

Polyuria often appears in the course of chronic meningitis (in three of the author's cases). This also exhibits exacerbations and remissions in agreement with the changes in the severity of the inflammatory phenomena; emaciation or the production of a general cachectic condition are never observed to result from it. In all of these cases which the author observed, the alterations of the meninges took on their greatest intensity at the base of the brain, and in the neighborhood of the medulla oblongata. Sometimes it was observed that the polyuria passed into glycosuria or albuminuria, or both these conditions together, a connection not at all surprising when the experiments of Cl. Bernard on the puncture of different points in the medulla oblongata are taken into account.

BRAIN DISEASE SIMULATED BY OVERSTRAIN OF THE CONVERGENCE MUSCLES OF THE EYES.—At the meeting of the Clinical Society of London, Mr. Brudenell Carter described the case. The patient was a young gentleman who was interrupted, whilst reading for honors at Oxford, by double vision and vertigo, followed, if the effort to read were continued or soon resumed, by sickness, palpitation, and intense headache. These symptoms were attributed to some obscure affection of the brain, and the patient was directed to leave the university without taking a degree. He remained for some time at home under medical treatment without improvement, and on coming to London for further advice, was told to take a voyage to Australia and back in order to rest his brain. He did so, but returned no better, and was then advised not to enter into business, and to abandon his engagement to marry. Mr. Carter was consulted about the case, in order that he

might say whether the ophthalmoscope revealed anything abnormal in the cerebral circulation. He found the patient to be very short-sighted, and that he had never worn spectacles. In reading he held his book seven inches from his eyes, and Mr. Carter ascribed the symptoms to inability to maintain this degree of convergence for many hours. He ordered spectacles to be worn constantly, and reading to be practiced at a distance of eighteen inches. In three weeks the patient returned cured, with his wedding day fixed, and his arrangements for entering into business completed. In his concluding remarks, Mr. Carter said that the case, though exceptional, was exceptional only in degree, and that many patients suffered from headache and other symptoms due only to impaired harmony of the ocular muscles, or to inordinate exertion of some of them. He urged that in every case of obscure head affection, the state of refraction, of vision, and of the muscles should be carefully investigated—at all events, before a patient was sent to Australia, or advised to abandon his position and duties in life.

Dr. Hughlings Jackson considered Mr. Carter's paper to be as interesting to physicians as to ophthalmic surgeons. He (Dr. Jackson) referred to a case in which hypermetropia, which was an indirect cause of nervous troubles, had been, by several eminent ophthalmic surgeons and by himself, misinterpreted. It disappeared when appropriate glasses were worn. Since then he had always considered the state of refraction of the eyes, as well as the state of the fundus, in patients who had what might be called minor cerebral symptoms. He referred to another case that he had seen with Mr. Carter, in which severe headache seemed to be fairly attributable to hypermetropia and astigmatism. He considered that cases of ocular palsy were, for the study of the nature of vertigo, the simplest of all cases. It was clear from these cases that vertigo was a motor symptom. It was not due to double vision, as commonly supposed, since it occurred on use of the paralyzed eyeball only —that is to say, under conditions in which double vision was impossible. Yet, as a matter of fact, vertigo, in physicians' practice at least, was not commonly met with in cases of ocular palsy. This was owing to the fact that in the case of the sixth nerve, the patient, so to speak, dodged the paralysis by holding his head stiffly inclined; and in the case of the third nerve, to the fact that the paralyzed eyeball was covered by the drooping lid. In the latter case the patient did not reel nor feel giddy; but if he closed the good eye, and if the paralyzed lid were upheld, he would, when walking, feel giddy, would reel and might feel sick. The vertigo was due to "erroneous projection." There was a duplex condition. There was over-estimate of the range of a movement of the eyeball intended, but not really performed, and action of movements of locomotion, in accordance with that false estimate, and thus overaction of them.

Dr. Poore thought Mr. Carter's case resembled cases of chronic fatigue of muscles, such as was seen in writer's cramp. As in that disease the muscle used for prehension of the pen, the first dorsal interrosseus, was put upon the stretch for hours at a time; so in Mr. Carter's patient the internal recti were put into a condition of overstrain. And, as in writer's cramp the muscles refused to act directly the pen was put into the hand, and headache, etc., ensued, so in this patient, who really had "reader's cramp," the muscles re-

fused to act; as soon as reading was attempted, double vision was produced. which recalled the symptoms of former attacks, and headache, vertigo, etc., followed.

Dr. Rasch had witnessed a case of serious vertigo, nausea, etc., simulating serious disease of the brain, in which a large clot was discovered in the external auditory canal. This having been syringed out, the patient immediately recovered. He had often known syringing of the ears to relieve such cases.

Mr. Carter, in reply, stated that this observation simply confirmed the conclusion at which he had arrived, that no stone should be left unturned in the investigation of all the causes which might produce symptoms similar to those that had occurred in the case which he had just read.—*British Medical Journal*, October 31, 1874.

HEMIOPIA IN BRAIN DISEASE.—Dr. Cohn of Breslau, *Klin. Monats Blætter f. Augenheilk.*, XII., 204. (Abstracted by Abadie in *Rev. des Sci. Medicales.*)

The author of this paper reports in detail five cases of hemiopia of cerebral origin, in which the measurement of the visual field was made with great care by means of the perimeter of Fœrster.

From these five observations he is enabled to show:

(1) That the line of demarcation between the sensible and insensible parts of the retina never passes through the yellow spot.

(2) That this line is never exactly vertical; it forms zigzags, encroaching on the vertical which passes through the point of fixation.

(3) There constantly exist more or less extensive peripheral lacunæ in the still persistent portion of the visual field.

This last remark, of great importance as we shall presently show, was previously made by Fœrster, Bernhardt, and others, in such a way that we may consider it as applying in the generality of cases.

If we hold to the theory of Mueller and of Longet, as to the decussation of the optic nerves, it is difficult to explain this last particularity. We are then forced to admit as the cause of the hemiopia, an interesting lesion of one of the optic bands, and a symmetrical one but less pronounced on the opposite side; which cannot happen in all cases. This theory of the semi-decussation renders the nasal hemiopia, observed by Græfe and Mandelstamm, in which the two temporal halves of the retina are paralyzed, still more inexplicable.

Admitting, on the other hand, the complete crossing of the optic nerves, anatomically demonstrated by Bisiadetski in 1861, and later by Mandelstamm, the explanation of the phenomena in question becomes much more simple. When a lesion is produced on the right side of the chiasm, there results a simple hemiopia on the left; but if the lesion extends toward the middle of the chiasm, the right side of the visual field, previously intact, also presents lacunæ.

Still other facts support this theory. In a case of temporal hemiopia reported by Samisch, there was found at the autopsy a tumor in front of the chiasm. Inversely, in a case of nasal hemiopia, observed by Schmidt, a tumor occupied the posterior part of the decussation of the optic nerves,

Finally the experiments of Brown-Sequard seem to be decisive. This physiologist demonstrated that the division of the chiasm in the median line produced a double amaurosis, while the section of a single optic tract produced blindness of the eye of the opposite side.

We have to confess that this new theory does not explain in a satisfactory manner, the hemiopia which takes place in cerebral hæmorrhage, happening not at the level of the chiasm, but in the substance of the encephalon itself. It would be of interest to learn how the nerve fibres from the chiasm distribute themselves over the retina. Michel and Schwalbe have already noticed in the pupils of birds, a complete decussation of nervous fibres before their opening out on plain of the retina. Perhaps some analogous disposition exists in man.

Hammer Palsy.—W. Frank Smith, *Brit. Med. Jour.*, Oct. 31st, gives brief accounts of eight cases of what he has called "hephæstic hemiplegia" or hammer palsy, occurring among the Sheffield iron workers, and coming under his own observation. Seven of the cases had been previously published in an article on the subject in the *Lancet*, March 27th, 1869, and are here given again for the purpose of comparison. The disease consists in a more or less partial hemiplegia, generally of the right side, with frequently some wasting and neuralgic pains, and in one case it was accompanied with aphasia and agraphia.

The cause, the author thinks, is the excessive exercise of a limited portion of the brain, in the production of the manual movements of the hammersmith. He says, "At first sight, as I have already written, these phenomena remind the observer of those cases of muscular atrophy limited to certain groups of muscles, which have been observed in masons, smiths, etc. Again the disease has points of contact with the condition known as writer's cramp, but found not only among scriveners, but among pianists, violinists, and tailors. On more mature reflection, it will be evident that the disease I am describing differs from muscular atrophy, and from writer's cramp, positively by the fact that the cerebral centres are implicated, as indicated by the occurrence of aphasia, agraphia, ptosis, facial palsy, surditas, and the other indisputable stigmata of hemiplegia."

Paralysis from Sulphate of Zinc.—B. F. Pope, Ass't Surg. U. S. A., reports *Phil. Med. Times*, Nov. 14th, the case of a negro woman in whom paralysis of the left upper extremity occurred suddenly on the suppression of a gonorrhœal discharge from the use of sulphate of zinc injections. Careful inquiry failed to reveal any other cause, and the author asks whether this paralysis is to be considered as due to the drug, or in some way to the sudden suppression of the discharge. Recovery was perfect in six weeks after treatment by general and localized faradization.

A Peculiar Symptom in Progressive Deafness.—Weber-Liel, *Monatschrift f. Ohrenheilk.*, 1874, No. 7, (abstracted in *Rev. des Sci. Med.*,) has observed in five years time, thirteen persons affected with progressive deafness,

and presenting a very remarkable symptom. Frequently they experience a spontaneous nervous pain over the track of the vertical plexus and the brachial plexus of one side, such as to sometimes produce for a time a torticollis. At the same time they complain of pain in the ears, and of hearing disagreeable sounds, rather different from the habitual tinnitus. These symptoms may be produced at will by pressure over a certain point on the side of the neck. This point, a little difficult to find at the first attempt, corresponds rather closely with the point of emergence of the brachial plexus and the great auricular nerve, which gives, perhaps at this place, an anastomosis with a branch of the facial.

Electricity applied in these cases, produced only a transient amelioration, and tenotomy of the tensor tympani, while bettering the habitual symptoms, has given no result in altering the phenomena described, of which as yet we have no explanation.

Amyotrophic Lateral Sclerosis.—We copy from the *Revue des Sciences Medicales*, the following condensation of the lectures of Charcot, reported by Bourneville in his journal *Le Progres Medicale*, pp. 325 and 341.

There exists a special disease characterized anatomically by a primitive and symmetrical sclerosis of the lateral white bundles of the cord, joined with the ordinary lesion of the anterior cornua in connection with muscular atrophy. The portion of the antero-lateral columns in which the inflammatory process may be so systematically limited, forms during fœtal and the commencement of extrauterine life, an anatomically distinct system from the other portions of the spinal cord. M. Charcot gives a resume of our knowledge of this bundle. In the adult it is seen behind an imaginary transverse line which passes by the commissure, under the form of a triangular space corresponding to the hindermost part of the antero-lateral bundle. This system is represented in the medulla, above the crossing of its fibres, by the anterior pyramids, and also in the protuberance and the lower portion of the cerebral peduncles.

It may be attacked with sclerosis, either on one or both sides, following cerebral lesions, but the symmetrical sclerosis of the lateral bundles may exist primarily, and may be either simple or accompanied with alteration of the gray substance. It is this morbid form, that forms the subject of these lectures.

Pathological Anatomy.—1. At the level of the cervical enlargement this symmetrical alteration occupies more space than anywhere else; it extends in front to the external angle of the anterior cornua, in the rear it is bounded approximately by the posterior gray substance, and externally it is separated from the cortical layer of the cord by an intact tract of white matter. In the dorsal region it is more circumscribed, and still more so in the lumbar region, where however, it touches the cortical substance externally. In the medulla the sclerosis invades the anterior pyramids in all their height; in the protuberance we can still follow the lesion, and sometimes even in the lower portion of the peduncle.

2. The alterations of the gray substance are those of protopathic spinal muscular atrophy; they are systematically localized in the anterior cornua,

and more extensive in the cervical region than anywhere else; in the medulla the lesion extends to the roots of the hypoglossal, spinal and facial nerves.

3. The alterations of the anterior roots of the peripheral nerves, consist in a slight simple atrophy, and in a granular state of the tubes.

4. The trophic lesions of the muscles do not differ from those we meet with in primary spinal amyotrophy, but the hyperplasia of the perimysium is more manifest.

Symptoms.—M. Charcot gives the observations of this disease that he has met with in medical literature. He insists on the rapidity of its evolution, which is such, that the patients affected with it, die three years after the beginning of the first symptoms.

The symptoms consist in an enfeeblement of the motor power, coming on generally in the upper limbs, without fever, after some tingling sensations; then appears an atrophy *en masse*, not limited to certain muscles as in progressive muscular atrophy. This atrophy cannot be accounted for by the paralysis alone; we observe some fibrillary movements, and the faradic contractility is preserved. The atrophied members take attitudes which constitute deformities, and are due to the spasmodic rigidity of certain muscles.

When some movements are still possible, they are accompanied with a tremor analogous to that in multiple sclerosis. The emaciation is considerable in five or six months.

After a variable period of arrest of some months' duration, the lower limbs are invaded by a paralysis which does not involve the bladder or the rectum, and is not accompanied with atrophy; but the muscles soon take on contractions, at first only temporary, but soon becoming permanent; the extensors predominate over the flexors, giving the members an attitude that they finally keep, while the muscles become slightly atrophied.

In a third stage the phenomena of glosso-labio-laryngeal paralysis make their appearance and the patient succumbs.

The paresis and the contractions are to be attributed to the symmetrical lateral sclerosis; this takes place before the lesion of the anterior gray matter, and the propagation of the lesion is undoubtedly made by way of the nervous filaments that establish a communication between the lateral columns and the anterior cornua.

The ætiology is very obscure, and the number of known facts is too few to enable us to give certain indications.

EPILEPSY.—Dr. H. Gibbons, *Pacific Med. and Surg. Jour.*, Nov., 1874, concludes an article on the Pathology and Pathogeny of Epilepsy, in which he notices the various views which have been held of this affection, as follows:

"To sum up, a proper view of the nature of epilepsy requires that we regard two conditions of the patient: 1, during the interval; 2, during the fit.

1. "During the interval there exists a permanent abnormal condition of the brain, impairing the function of that organ as to its control of the muscular system. This condition may result from injury, pressure, organic disease, bad habits of various kinds, inheritance, etc. There is also a morbid condition, organic or functional, of the medulla oblongata (or spinal cord?).

2. "In this condition of the brain, any peripheral nervous irritation, acting directly, or through the cord, or both, overcomes its function; consciousness is suspended, and with it the control of the brain over the muscular system, which, left at the mercy of the irritated or diseased medulla, is thrown into the state of spasm. When the muscular irritability and the medullary irritation are exhausted, the spasm ceases.

"We may also admit the occurrence of epilepsy, without any lesion outside of the brain itself. It is reasonable to suppose that an organic lesion of the brain may, during the arrest of consciousness, provoke a sound cord into the production of convulsion."

ALSO the following recent papers in this department, of which we can here only give the titles:

LUBIMOFF, On the Histology and Pathological Anatomy of the Sympathetic Nervous System, *Virchow's Archiv*, LXI, II, 145, Aug , 1874; BURR, The Insanity of Inebriety, *Psych. and Med. Leg. Jour.*, Dec., 1874; HUGHLINGS JACKSON, On the Scientific and Empirical Investigations of Epilepsies, *Med. Press and Circular*, (cont. article); O'DEA, The Philosophy of Suicide, *Psych. and Med. Legal Jour.*, (cont. article); HITZIG, On the Reaction of Paralyzed Vascular Muscles, *Berliner Klin. Wochenschrift*, No. 30; CHVOSTEK, On Multiple Sclerosis of the Central Nervous System, *Wiener Med. Presse*, (continued article running through many numbers); BIERBAUM, Uræmia of the Brain, *Deutsche Klinik*, Nos. 25–30; ELISCHER, On the Alteration of the Peripheral Nerves and the Cord in Chorea Minor, *Virchow's Archiv*, LXI, IV Heft, Oct., 1874; ARNDT, Aphorisms on the Pathological Anatomy of the Nervous Central Organs, *Ibid;* SAWYER, Some Neuroses of the Larynx, *Brit. Med. Jour.*, Oct. 31st; MOTTA, On Anæmia of the Brain in General, and particularly Cerebral Bloodlessness, and the Consecutive Softening, *brochure*, Lisbon, (abstracted in *Deutsche Klinik*); LUNIER, On the Influence of great Political and Social Disturbances on the Development of Mental Diseases, *Ann. Med Psychologiques*, (cont. article); JOLLY, The Imagination in its Relations with Philosophy and Medicine, *Ibid*, Sept., 1874; MOBECHE, Considerations on the Conditions of the Eyes in General Paralysis, *Ibid*, Nov.; BALL, Cerebral Tumors, (lectures at the Hotel Dieu, reported in *Gaz. des Hopitaux*); KOEPPE, Wounds of the Head as Peripheral Causes of Reflex Psychoses, and their Treatment, *Deutsches Archiv f. Klin. Medicin*, XIII, 4 and 5 Heft; ACKER, Paralysis Following Diphtheria, and on Subcutaneous Injections of Strychnia, *Ibid*; and in the *Archiv fuer Psychiatrie*, V, 1 Heft, the following: LUDWIG MEYER, On Deformities from Deficient Development in Idiots; ADLER, Some Pathological Alterations in the Cerebral Vessels of the Insane; WESTPHAL, A Case of Cavity and Tumor in the Spinal Cord, with Disease of the Medulla and certain Cranial Nerves; TH. SIMON, on the Pathology and Pathological Anatomy of the Central Nervous System; HUBRICH, Nervous Deafness; SAMT, the pathology of the cortex; EISENLOHR, Acute Spinal Paralysis; etc., etc.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

Antagonism of Remedies.—We copy the following conclusions drawn from the experiments of the committee of the British Association on the antagonism of medicines, from the report of the chairman, Dr. J. Hughes Bennett, published in the current numbers of the *British Medical Journal*, in October, November and December. The experiments were made upon dogs, cats, rabbits and rats.

The Antagonism between Chloral Hydrate and Strychnia.—"It appears to be established from these experiments:

(1.) "That after a fatal dose of strychnia, life may be saved by bringing the animal under the influence of chloral hydrate.

(2.) "That chloral hydrate is more likely to save life after a fatal dose of strychnia, than strychnia is to save life after a fatal dose of chloral hydrate.

(3.) "That after a dose of strychnia, producing severe tetanic convulsions, these convulsions may be much reduced, both in force and frequency, by the use of chloral hydrate, and consequently much suffering saved.

(4.) "That the extent of physiological antagonism between the two substances is so far limited, that (1) a very large fatal dose of strychnia may kill before the chloral hydrate has had time to act; or (2) so large must the dose of chloral hydrate be to antagonize an excessive dose of strychnia, that there is danger of death from the effects of the chloral hydrate.

(5.) "Chloral hydrate mitigates the effects of a fatal dose of strychnia, by depressing the excess of reflex activity excited by that substance, while strychnia may mitigate the effects of a fatal dose of chloral hydrate by rousing the activity of the spinal cord; but it does not appear capable of removing the coma produced by the action of chloral hydrate on the brain."

It is scarcely necessary to point out the vast importance of these results to practical medicine and the indications they afford, not only in cases of poisoning by strychnia, but in cases of tetanus and other spasmodic diseases, reflex and central.

The Antagonism between Sulphate of Atropia and Calabar Bean.—After alluding to the investigations of Dr. Fraser in regard to this antagonism, and stating that the results obtained by the committee agree in the main with his, the experiments are detailed, and the following two general conclusions are offered:

(1.) Sulphate of atropia antagonizes to a certain extent the fatal action of calabar bean.

(2.) The area of antagonism is even more limited than Dr. Fraser has indicated in the paper already referred to.

In all the experiments made in connection with this branch of the inquiry, it was found that so-called antagonism existed within very narrow limits. The danger was, not death by too great a dose of sulphate of atropia, the supposed antagonist, but death from the effects of the extract of calabar bean. In this respect, there was also a marked contrast to the action of hy-

drate of chloral on the physiological effects of strychnia. In the latter instance, the danger evidently would be, in a case of poisoning by strychnia, to give too large a dose of hydrate of chloral; whereas, in the case of poisoning by extract of calabar bean, it would apparently be very difficult to arrest its effects by sulphate of atropia, because a small dose of the latter produces little effect (at all events, in rabbits), and the effects of the extract of calabar bean are so violent as soon to destroy life. It results, that for all practical purposes, atropia, as an antidote to calabar bean, is useless, and not to be compared with the effects of chloral hydrate, as shown by the committee under the next head.

Chloral Hydrate and Calabar Bean. — The following conclusions are given as to the antagonism between these two remedies:

(1.) That hydrate of chloral modifies to a great extent, the action of a fatal dose of extract of calabar bean, mitigating symptoms, and prolonging life.

(2.) That hydrate of chloral, in some cases, saves life from a fatal dose of extract of calabar bean.

The experiments clearly show, that if chloral is given first, so as to have the system well under its influence before it receives the extract of calabar bean, the symptoms of the latter are much modified, and life saved from what would otherwise be a fatal dose. On the other hand, chloral hydrate is of comparatively little service if given some time after the calabar bean, since the latter produces its most severe physiological effects ten or twelve minutes after the administration of a fatal dose, and in some cases, even sooner. Chloral hydrate, on the other hand, requires at least fifteen or twenty minutes to produce its effects.

From the experiments, the committee conclude that in these two agents, we have a good example of physiological antagonism. This antagonism is however, limited, as in all such cases, by two conditions:

(1.) *By the doses administered.* More than a minimum fatal dose destroys life, even after the administration of chloral hydrate.

(2.) *By the interval of time between the administration of the two substances.* There is a great probability of saving life when the two are given together. This probability is diminished if the chloral hydrate be given five or eight minutes later than the other; and there is no chance at all if given later than eight minutes after a fatal dose of calabar bean. But even in those cases where death occurs from this cause, the symptoms are greatly modified by the use of chloral.

Hydrochlorate and Meconate of Morphia and Calabar Bean.—Experiments were also instituted to ascertain the antagonism, if any existed, between hydrochlorate and meconate of morphia and calabar bean. The conclusion reached was, that they are in no way antagonistic.

Sulphate of Atropia and Meconate of Morphia.—After a careful series of experiments to determine the separate action of these drugs on rabbits and dogs, those for the purpose of ascertaining their relative action toward each other were performed. The experiments on the action of the meconate of

morphia yielded the following general conclusions as to its effects on dogs and rabbits:

(1.) In both animals, meconate of morphia acts on the encephalon and on the spinal cord; but in the case of dogs, the action is more cerebral, while in rabbits, it is more spinal.

(2.) As John Harley states, either delirium or hypnotic effects may be produced. In the experiments recorded, hypnotism was the predominant effect.

(3.) In the case of rabbits, death is often produced by convulsions.

(4.) In both cases, while deeply under the influence of the drug, as stimulation of the motor nerves caused muscular contractions, we must hold that the sensibility and conducting powers of the nerves are not destroyed.

(5.) In both cases, stimulation of the vagus in the neck, caused stoppage of the action of the heart; consequently, the vaso-inhibitory fibres in the vagus are not paralyzed by meconate of morphia. It is possible, as Harley appears to think, that these fibres may be irritated.

(6.) Stimulation of the sympathetic in both cases, causes dilatation of the pupil; consequently, the sympathetic trunk is not paralyzed, and the contraction of the pupil must be owing to the cranial origins of the third nerve being irritated, thus causing contraction of the circular fibres of the iris, governed by that nerve, and consequent contraction of the pupil.

(7.) Morphia may affect the action of certain nerves, by paralyzing the nerve-centres from which they issue, but the nerves themselves, apparently still retain sensibility and conductibility.

The inferences drawn from the experiments on the antagonistic action of the two drugs, are as follows:

(1.) Sulphate of atropia is physiologically antagonistic to meconate of morphia within a limited area.

(2.) Meconate of morphia does not act beneficially after a large dose of sulphate of atropia, for in these cases the tendency to death is greater than if a large dose of either substance had been given alone.

(3.) Meconate of morphia is not specifically antagonistic to the action of sulphate of atropia, on the vaso-inhibitory nerves of the heart; and

(4.) The beneficial action of sulphate of atropia after the administration of large doses of meconate of morphia, is probably due to the action sulphate of atropia exercises on the blood-vessels. It causes contraction of these, and thus reduces the risk of death from cerebral or spinal congestion, as is known to occur after the introduction of fatal doses of meconate of morphia. It may also assist up to a certain point, not precisely fixed in these experiments, by stimulating the action of the heart through the sympathetic, and obviating the tendency to death from deficient respiration observed after large doses of morphia.

In summing up the results of their experiments, the authors say:

"It appears from the above experiments, that in dogs, sulphate of atropia modifies the symptoms of poisoning by meconate of morphia, diminishes their intensity, and may even save life after a fatal dose of the latter. It is, therefore, decidedly antagonistic, but within a limited area. In man, sulphate of atropia would be too dangerous and uncertain a remedy to depend

on in cases of poisoning by opium or any of its salts; but where the heart's action is greatly diminished, it is directly indicated."

The committee accepted and republish the results of a series of experiments on the physiological action of theine, caffeine, cocoaine and guaranine, made by Dr. Alex. Bennett, under its supervision (see this journal, Jan., 1874). They then proceeded to investigate the antagonism between these agents and meconate of morphia. We will proceed to give our readers the results of their experiments, as far as they have come to hand at the time of going to press.

The experiments as to the antagonism between theine and the morphia salt, were performed on cats and rabbits. On the latter, they were unsatisfactory, as it became evident that this animal was not influenced by the meconate of morphia like the carnivorous animals. On cats, the results were more evident, and are given in tabulated form. The committee say:

"This table shows without doubt, that theine influences the physiological action of meconate of morphia; because after a dose of that drug, which alone would produce coma, if theine be also introduced, it is followed by a period of cerebral excitement. Although the limits of the antagonistic action are narrow, it will be seen (1) that while a cat may recover from the effects of a dose of 1¾ grains of meconate of morphia given alone, it will rarely recover (Exp. 494) from the effects of a dose of 2 grains, even should the effects of the latter dose be modified by those following the introduction of 4 or 5 grains of theine; (2) that in three cases (Nos. 501, 504 and 505), the animals recovered from the effects of 1¾ grains of meconate of morphia, and 4 to 5 grains of theine, while they died when the same dose of meconate of morphia was administered eight days afterwards; (3) that when the dose of theine was increased beyond 5 grains, the animals invariably died, apparently from the effects of the theine (Exp. 488, 489, 490). The important result, however, is shown that fatal doses of meconate of morphia (1¾ and even 2 grains), may be completely antagonized by theine."

The antagonism between caffeine and guaranine and meconate of morphia, were investigated in the same way, with the same result of establishing the fact, that to a limited degree it did really exist, and in certain instances, to the extent even of saving life.

The publication of the report of the committee is still progressing, and we shall give the further results in a future number.

VERATROIDEA.—H. C. Wood, Jr., sums up the conclusions of a continued article in the *Phil. Med. Times*, Nos. 147, 148, and 149, as follows:

"In concluding this investigation upon the action of veratroidea on the circulation, the results arrived at may be summed up in a few words.

"The action of this alkaloid upon the circulation is altogether subordinate to its influence upon the respiration.

"In minute doses it stimulates the cardiac inhibitory nerves or nerve centres, but when given in sufficiently large doses it finally paralyzes the peripheral inhibitory cardiac nerves.

"It exerts some action upon the heart-muscle or the contained ganglia; this action is probably a sedative one, but it is very feeble, and is only dis

tinctly perceptible when the drug is precipitated at once upon the heart, or when the dose given is much above that required to arrest respiration. To kill the heart-muscle very large amounts are required.

"Upon the vaso-motor system, veratroidea acts as a depressant, but its influence is feeble, much less intense than its action upon the pneumogastrics. When artificial respiration is maintained, it can be given in such doses as to paralyze the vaso-motor centres."

HYDROCYANIC ACID.—The *Practitioner*, for September, republishes with comments, a paper by Dr. Bœhm, taken from the *Archiv f. Exper. Pathologie and Pharmakologie*, on the physiological action of this substance. We extract from it the following general conclusions.

(1) "The operation of prussic acid is directed upon the central nervous system, whose functions are annihilated by large doses, after a brief excitement or increase.

(2) "The lesions of respiration and circulation arise from analogous changes in the activity of their centres in the medulla oblongata.

(3) "The vagus plays no part, either in the effect of prussic acid on the respiration, or in its effect upon the heart.

(4) "Atropine is not an antidote to prussic acid. The only rational treatment of this poisoning, is the persevering performance of artificial respiration.

"How the results of our researches agree with the physiological-chemical operation, is a question for whose decision further researches must be made, but the solution of which is, we believe, simplified by our physiological discoveries."

Remarking on this paper, Dr. Anstie says: "The above paper seems to us of very high practical interest and importance, as confirming at least partially, Preyer's assertion as to the possibility of reviving animals poisoned with prussic acid, by means of artificial respiration perseveringly carried out. It deserves very careful attention, and, on the other hand, if the antagonism of atropine does not exist, the sooner this is known the better. Considering the justly high reputation as an experimenter which Preyer holds, we are not prepared to accept as final the decision now pronounced by Bœhm against the antidotal powers of atropine.

"Certainly, however, we are not particularly inclined to believe that hydrocyanic acid acts solely or mainly as an exciter of the vagus. If that were so, it would not have been possible for us to note, as we have repeatedly noted, in accordance with Bœhm's observation, that animals dying, even quite suddenly, from a large dose of the acid, while lying perfectly motionless and flaccid, may still exhibit very distinct cardiac pulsation, for as much as twenty or twenty-five minutes. And, indeed, the general toxic picture presented by an animal rapidly poisoned with prussic acid, is far enough from conveying the idea of an intoxication so singularly limited as Preyer would have us believe. The protruded, tense and glistening eyeballs, the dilated pupils, and the foam at the mouth, seem to speak unequivocally to a powerful action on the encephalic centres.

"In short, we must say that while Preyer's recommendation of artificial respiration in prussic acid poisoning is strongly corroborated, the antagonistic action of atropine has been for the moment seriously discredited, if not altogether overthrown."

DIFFERENCE IN THE ANÆSTHESIA PRODUCED BY CHLOROFORM AND ETHER.—M. Schiff, communication to the *Societa Medico-Fisica* of Florence, *L. Imparziale*, March 17th (abstracted in *Rev. des Sci. Medicales*). This communication, based on more than five thousand experiments, offers the following conclusions:

Ether and chloroform cause a paralysis of conscious sensation and voluntary movements. Ether produces paralysis of the respiration, while the circulation and blood pressure are yet compatible with life; that is to say, when this accident occurs, artificial respiration will still cause the necessary exchange of carbonic acid and oxygen. It is only after the paralysis of the respiration has taken place, that ether causes paralysis of the vessels, and finally of the heart.

On the other hand, chloroform may give rise to vascular paralysis, before paralyzing the respiration. In this case artificial respiration is inefficacious, the exchange of the gases being suppressed. In those cases where in chloroformic anæsthesia we see artificial respiration produce spontaneous movements of the thorax, the animal nevertheless dies all the same.

There are certainly contra-indications to chloroform that cannot be always determined, since death occurs during the first inspirations. On the contrary, ether is more reliable in this regard, and the surgeon is responsible for accidents which may occur from its administration.

Whenever during etherization, the temperature does not fall below 28°C. (=82.4 F.) the animal can be revived by artificial respiration; at 27° C. (=80.6°) artificial heat must be employed.

The lowering of the pressure depends on paralysis of the vaso-motor nerves of the peripheral vessels, which lead off a greater amount of blood than returns to the heart. The blood pressure increases if the abdominal aorta is compressed, or if saline water is injected into the veins.

CHLORAL HYDRATE.—P. Fauny, *These de Paris*, 1874, (abstracted in *Rev. des Sci. Med.*)

This thesis contains numerous unpublished observations of eclampsia treated by chloral.

They were made in the *maternites* of the hospital "La Charite", and the hospital "Cochin", and have a real scientific value. The hydrate of chloral was administered either internally by the stomach or rectum, or by subcutaneous injections. In the case XXIV, notably, there was injected a solution of the strength of 1-12, by means of a Pravaz syringe of large size, without producing any untoward result in the subcutaneous cellular tissue.

The two following statistical statements are given by M. Fauny:

1. *Chloral given after other previous treatment* (leeches, bleedings, purgatives, revulsives, anæsthetics, etc.):

Cases treated, sixteen; cures, fourteen; deaths, two.

2. *Chloral alone employed:*

Cases treated, twenty; unknown, one; cures, nineteen.

The results obtained by this method are very encouraging; M. Fauny believes he is justified in drawing the following conclusions:

The hydrate of chloral treatment, is with our present knowledge, the best method in puerperal eclampsia.

It is indicated not only when the signs are manifest, but also whenever there is any reason to suspect the invasion of the disease.

Decomposition of Chloral.—At a recent *seance* of the French Academy of Sciences (reported in *L'Union Medicale*, No. 151). M. Berthelot presented a communication from M. Tanret, which is of interest in a medical point of view:

"If to a mixture of the solutions of chloral hydrate and permanganate of potash we add an alkaline solution, of caustic potash for example, we observe an evolution of gas, and the liquid at the same time loses its color and precipitates the hydrated sesquioxide of manganese. When we use only a few grammes of hydrate of chloral, and only warm the mixture up to 40° C. (= 104° F.), the reaction ends only after the lapse of several hours; and then subjecting the filtered liquid to analysis, we find it containing chlorate, carbonate, and formiate of potash; as to the gas, we have recognized it as carbonic oxide. The chloral hydrate is therefore decomposed by the permanganate in the alkaline solution into carbonic oxide, carbonic acid, formic acid, and an alkaline chloride. The permanganate solution need not be a concentrated one any more than the alkaline solution; in using dilute solutions, and even substituting borax for the potassa, the reaction occurs all the same.

"These facts naturally suggest a theory of the action of chloral in the economy, based on its decomposition in the phenomena of oxidation, which take place in the blood. Chloral introduced into the circulation, is submitted to oxidizing influences; further, as is well known, the blood serum is alkaline—two circumstances which are not without analogy in the experiment just related. It may, therefore, set free carbonic oxide, which, according to Claude Bernard's experiments, combines with the globules of the blood, displacing the oxygen originally there, and then these globules become unfitted for their physiological functions. It is only by again freeing them from the carbonic oxide that they become revivified.

"Does not the slow decomposition of chloral by the oxidizing agent, explain the continuity of its action as a hypnotic, as the theory of its transformation into chloroform cannot? and does not the lowering of the temperature observed by Claude Bernard in poisoning, although incomplete, by carbonic oxide, coincide in a remarkable manner with that following the administration of chloral? Chloral acts, therefore, by a sort of intoxication, and thus we can explain the accidents which may follow its use. These hypotheses, given provisionally, serve to afford an altogether new explanation of the action of chloral on the economy."

Intravenous Injections of Chloral.—At the session of the *Acad. des Sciences*, Nov. 2, 1874 (reported in *Rev. Scientifique*), M. Ore submitted the following

conclusions as to the method of injecting chloral into the veins, in which he claims to have the support of fourteen successful cases:

"*Operative proceedings.*—A condition essential to success, consists in the simple puncture without denudation, and particularly without dissection and isolation of the vein. If the subject is extremely corpulent, and the veins very little apparent, an incision may be made down to the vein, so that its wall becomes visible; then the puncture should be made without further separation of the neighboring parts.

"*Dose.*—I have always employed a solution of the strength of one-fourth (10 grammes of chloral to 30 grammes of water). Whatever the strength of the solution, all our observations demonstrate this result, that anæsthesia has always appeared with less than five grammes of chloral; and that from five to seven or eight grammes will suffice to bring on insensibility in the most important operations. I may add that when the corneal sensibility has disappeared, it is not necessary to hasten the operation; waiting then, three or four minutes, the duration of the insensibility is much prolonged.

"*Time needed to produce Anæsthesia.*—Allowing that the dose of chloral varies between five and eight grammes, we ought to inject about one gramme a minute. The duration of the injection, varies therefore, between five and eight minutes. If we leave the canula too long in the vein, it causes the production of a clot.

"*Advantages.*—(1.) They do not disturb the respiration; (2) they cause an insensibility which varies with the dose; (3) they produce no period of excitation; (4) they are never accompanied with vomiting; (5) they are always followed by a profound sleep, calm and regular, lasting ten, eleven, fourteen, and even twenty-four hours, doing away completely with the immediate inconvenient results of the operations; (6) they are never followed by phlebitis, hæmaturia, or clot, when they are properly performed."

M. Lannelangue reports in the *Gaz. des Hopitaux*, October 27, 1874, a case of traumatic tetanus, unsuccessfully treated by intravenous injections of chloral. The autopsy revealed clots in the veins extending some distance above the points of injection, and in the right side of the heart, entering also into the pulmonary artery. The lungs were found strongly congested at the base and towards their posterior parts.

M. Lannelangue is disposed to consider these as due to the treatment, and that it, instead of having a beneficial effect, tended to actually hasten death. The patient did not succumb, as in ordinary cases, to asphyxia from fixation of the muscles of respiration, but to these lesions in the heart and lungs which, moreover, explain certain symptoms observed during life. He is, therefore, not disposed to recommend the method of injecting chloral into the veins in the treatment of disease.

Chloral, Atropia and Morphia. — Dr. Roberts Bartholow, at the meeting of the Cincinnati Academy of Medicine, Oct. 28 (reported in the *Clinic*), read a very interesting paper on the combined administration of these three substances, illustrating his paper by experiments on rabbits.

A solution of chloral was injected under the skin of the first rabbit. A state of profound anæsthesia soon followed. The action of the heart was

extremely rapid, but quite feeble. This was shown by the following instrument: a straw about a foot in length is armed at one extremity with a needle, which is thrust into the heart of the animal. To the other end of the straw, a bit of paper is attached, and the vibration of the distant extremity indicates the force of the heart's action. A solution of chloral, morphia and atropia, was injected under the skin of the second animal. In this rabbit, the anæsthesia was not so profound, the morphia counteracting the depressive effects of the chloral. The heart's action was also shown to be much stronger in this case. On irritation of the Schneiderian membrane, the force of the heart's action was much increased, and the pulsations reduced in number; and it was shown that on carrying this irritation to a sufficient extent, the heart would cease pulsating altogether. Dr. Bartholow said he had obtained good results from the combined administration of these agents in neuralgia and other painful diseases, and regarded their beneficial effects when combined, as much greater than when used separately.

ESERINE.—Dr. Martin-Damourette, *Jour. de Therap.*, Nos. 1 to 7 inclusive. (Abstracted in *Rev. des Sci. Medicales* by Dr. Henri Huchard.)

"Eserine possesses three elementary actions:

(1.) "Augmentation of the muscular irritability, which, however, only becomes important when very large doses are given.

(2.) "Increase of the excitability of the motor nervous centres, cerebro-spinal and sympathetic, exhibiting itself when large doses are given, and adding to the myasthenic action of the drug, the peculiar spasmodic and convulsive phenomena of eserism.

(3.) "Finally, diminution of the excitability of the spinal motor nerves at their muscular terminations, showing itself in muscular feebleness; and, in its extreme degree, abolition of the movements of locomotion; and still later, of those of respiration, causing death by mechanical asphyxia. The movements of the heart and the unstriped muscles, generally survive those of the organs of locomotion and respiration, as the paralysis invades the ganglionary and bulbar nerves more slowly than those of the spinal system."

One fact that struck the author's attention was, the slowness with which the arrest of respiration took place, showing that the phrenic nerve is the last to be affected, excepting the bulbar and ganglionary nerves. Hence one advantage in the use of eserine in the treatment of tetanus, since the animal with the most complete motor paralysis still continues to breathe with apparent ease.

The hypokinetic property of eserine is the one to be used in therapeutics. It is obtained only with divided doses, as the author has experimentally demonstrated.

Finally, the eseric myopia and macropia are due to the contraction of the ciliary muscle, parallel to that of the pupillary constrictor.

The experiments of Martin-Damourette have enabled him to demonstrate an antagonism which eserine develops in the motor nervous system between the centres, of which it increases the excitability, and the motor extremities of the nerves, which it paralyzes in the muscles. According to the one of these two actions that predominates at different periods, there are presented

during the intoxication, three stages, well marked when large doses of the sulphate of eserine are given, viz., a convulsive or myasthenic stage; a mixed or transition stage; and a stage of paralysis.

En resume, the augmentation of the excitability of the motor nervous centres, and the irritability of the muscles, are especially marked with large doses, and are the first to be produced. The abolition of the excitability of the spinal motor nerves, is the only effect that deserves to be noted, with small doses; while as with large doses, it only appears after the two preceding, about twenty minutes after the beginning of the poisoning, that is to say, when the quantity of poison to be eliminated becomes slight. Eserine, therefore, creates an antagonism between the motor nervous centres which it excites, and the motor terminations, which it paralyzes.

It is necessary, therefore, to keep in mind, in the therapeutic consideration of eserine, that large doses produce the convulsive form of eserism, and often cause death; while divided doses, small at first and gradually increased, bring on the paralytic form. In this last case, the treatment ought not only to be graduated and divided, but it should be kept up without interruption, if we do not wish to lose the tolerance of the remedy that has been acquired.

The author prefers the sulphate of eserine to the extract of calabar bean, as possessing a more intense and constant action; he also prefers the method of hypodermic injection to administration by the stomach; their effect being more marked and prompt, and more in proportion to the doses employed.

It follows from these facts, that in cases of tetanus, to obtain a neuro-paralytic effect, we ought to commence with about one milligramme (= .005 grains), and repeat these small doses every two or three hours, according to the effect produced. By this procedure, we are able to obtain success with the eserine treatment; the cases of failure are due to insufficient doses, not given for sufficient time; perhaps, because the patient succumbs at once to the rapid progress of the disease, or perhaps, because the medication was too soon abandoned.

The antagonism of eserine with itself, is proved by the following two experiments: Of two rabbits of the same weight, one is killed by the injection of four milligrammes of sulphate of eserine, while the other becomes able to tolerate the four times as much poisonous quantity of sixteen milligrammes, by taking it in divided doses in eight hours.

Next studying the antagonistic action of atropine and eserine, the author first passes in review the results obtained by Fraser. The latter gave to a rabbit a dose larger than the toxic dose of extract of calabar bean, and at the same time a non-poisonous dose of atropine, and the animal survived. As a test experiment, the animal was killed a few days later by a quantity of calabar bean, even less than it had previously tolerated.

These experiments of Fraser established the fact, that non-toxic doses of atropine are antidotal to toxic doses of eserine in the rabbit, and that the antagonistic power of atropine may rise so high as to neutralize three and a half times the toxic dose of eserine; that the atropine injection exercises a more intense and prolonged antidotal power when it is given before, rather than after that of the eserine; and finally, that the antidotal doses of atropine vary

on a large scale, from about a two thousandth to a fifth, and even a quarter of the toxic dose, and that this scale is the more extended as the dose of poison is above the minimum lethal quantity. All these results are subordinate to the same fact, viz.: that the neuro-paralysis produced by doses of atropine, much smaller than the toxic dose, opposes itself to the convulsions that large doses of calabar bean or eserine always produce.

Further, Fraser arrived at the following paradoxical conclusion: atropine is antagonistic to eserine, while eserine is not so to atropine; that, on the contrary, a non-fatal dose of eserine renders a non-toxic dose of atropine mortal. This is because a small dose of eserine produces a neuro-paralysis, which, added to that of non-fatal doses of atropine, suffices to cause paresis of the phrenic nerves, and death by asphyxia.

These two poisons taken together, are therefore, not antagonistic the one to the other, but they produce opposable phenomena only, when given in a certain proportion, and at a determinate time. The experiments of Martin-Damourette show, that in opposing non-lethal doses of the two poisons, we constantly produce death.

Seeking next to determine the toxic and non-toxic doses of sulphate of eserine in the sparrow, the author shows that between thirty-five and forty centimilligrammes is the minimum fatal quantity.

In the same bird, the highest non-toxic quantity of sulphate of atropine in one injection is eight milligrammes, as this quantity never killed the female sparrow, which succumbed to the dose of eight and a half milligrammes. These experiments show that the paresis of the motor nerves is the dominant symptom of atropism, the first to appear and the last to cease; and we understand how Fraser was able to neutralize the convulsive action of toxic doses of eserine by the motor paresis of small quantities of sulphate of atropine. We understand also, how in giving first a non-fatal quantity of eserine, and consequently paralyzing motion, he killed rabbits with an equally paralyzing dose of atropine. Here the neuro-paralytic action of the two poisons combined to cause paralytic suffocation. But the other effect may be seen when non-poisonous but larger doses of the two poisons destroy life by convulsive asphyxia, by combining their spasmodic action, if given simultaneously.

From these facts we deduce: (1) that eserine and atropine, given in non-poisonous doses, but still large enough to exert their convulsive action, cause death by asphyxia, the spasmodic phenomena of these poisons aiding in producing the neuro-paralyses; (2) that each of these two agents, given in lesser doses than the toxic one, produces the common paretic effects of the two substances; if their action is intense enough, their addition may cause death; if less so, they produce an akinesia utilisable in practice; (3) that if the dose of atropine is very slight (from one-twelfth to one-fourth of the toxic dose for example), it only develops that degree of neuro-paralysis sufficient to destroy the eseric convulsibility of fatal doses; in a word, we obtain the antagonism of atropine to eserine described by Fraser.

The *scientific* antagonism of the two agents only appears between the toxic or convulsant doses of eserine, and feeble or paralytic doses of atropine; it is not produced with non-poisonous doses of the two substances, whether

these are sufficiently large to act by the addition of their convulsant effects, or only by the sum of their paralytic actions. Finally, the antidote ought to be given a little before the poison, so that the paralysis it produces may anticipate the convulsant action of the eserine. If the atropine is administered after the eserine, it ought to be given as soon as possible before the spasms appear (at the end of from seven to twenty-five minutes in the rabbit). The antidotal action of the atropine does not occur in the rabbit, if it is given more than fifteen minutes after the other poison.

As regards the therapeutic antagonism, it is scarcely practicable to render it available, since the atropine only acts antagonistically when administered within a few minutes of the eserine poisoning, and when given later, it adds its own paralyzing action to that of the latter, and increases the chances of a fatal termination. Further, the quantity of the antidote must be determined by the dose of poison taken, which is often far from being known, and by the time of the poisoning. Hence the following three conclusions:

(1.) The antagonistic action of small doses of atropine to toxic doses of eserine, is incontestably demonstrated on animals, but cannot be tested on man save with the greatest caution.

(2.) The synergic actions, either convulsant or paralytic, of the two substances, given in non-poisonous doses, more or less considerable, combine, on the other hand, to cause death.

(3.) Nevertheless, the neuro-paralysis produced by both, incited therapeutically by moderate doses, authorizes their combined employment in the treatment of certain convulsive neuroses, and particularly in tetanus.

Among others, we may mention particularly the following titles of paper recently published, bearing on the therapeutics of the nervous system and mind:

Dujardin-Beaumetz, On the Therapeutic Action of Apomorphine, *Bull. Gen. de Therap.*, Oct. 30.; Laborde, Comparative Study on the Physiological Action of the Chlorates of Potassa and Soda; the Bromides of Potassium and Sodium; Deductions Relative to the Comparative Therapeutic Use of these Substances, *Ibid*, Sept., Oct. and Nov.; De Stefani, Clinical Facts Showing the Prodigious Effects of the Alcoholic Extract of Nux Vomica in large doses, in Various Forms of Acute and Chronic Nervous Disease, *Lo Sperimentale*, XXXIII, 1874; pp. 502 and 628; Cantieri, An Experimental Study on Cantharides, Considered as a Medicament, *Ibid*, XXXIV, pp. 318 and 393. Lussana, Alcohol: its Aldehydes and its Vinous Ethers, *Ibid*, 468 and 537 (uncompleted); Lawson, Neurotic Medicines, with Special Reference to Camphor and its Monobromide, *Practitioner*, November; W. Munro, On the Various Therapeutic Uses of Calabar Bean, especially in Tic., *Brit. Med. Jour.*, Oct. 31; Von Schroff, On the Action of Antiarin on the Circulatory Organs, *Stricker's Med. Jahrbucher*, III and IV Heft., 1874; Prokop Rokitansky, On the Influence of Chloral Hydrate on the Irritability of the Nervous System, *Ibid.*

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Medicinische Central-Zeitung.
Allgemeine Zeitschrift fur Psychiatrie und Psychisch. Gerichtl. Medicin.
Annales Medico-Psychologiques.
Archiv fur Anatomie, Physiologie, und Wissenschaftl. Medicin.
Archiv fur Path. Anatomie, Physiologie, und fur Klin. Medicin.
Archiv fur die Gesammte Physiologie der Menschen und Thiere.
Archiv der Heilkunde.
Archiv fur Psychiatrie.
Archives Generales de Medicine.
Archivio Italiano, per le Malattie Nervosi.
Berliner Klinische Wochenschrift.
British Medical Journal.
British and Foreign Medico-Chirurgical Review.
Bulletin Generale de Therapeutique.
Centralblatt f. d. Med. Wissenschaften.
Der Irrenfreund.
Deutsches Archiv f. Klinisches Medicin.
Deutsche Klinik.
Dublin Journal of Medical Sciences.
Edinburgh Medical Journal.
Friedrich's Blaetter f. Gerichtl. Medicin.
Gazette Medicale de Paris.
Gazette des Hopitaux.
Il Galvani.
Jahrbuch f. Kinderheilkunde u. Physische Erziehung.
Jahresbericht u. d. Leistungen u. Fortschritte in der Gesammt. Medicin.
Jenaische Zeitschrift f. Medicin u. Naturwissenschaften.
Journal of Anatomy and Physiology.
Journal de l'Anatomie et de Physiologie, etc.
Journal de Medicine et de Chirurgie Pratiques.
Journal of Mental Science.
Lo Sperimentale.
L'Union Medicale.
Medicinisches Correspondenzblatt des Wurtemb. Aerztl. Vereins.
Medicinisches Jahrbucher.
La Nuova Liguria Medica.
Progres Medicale.
Psychiatrisches Centralblatt.
Rivista Clinica.

Revue des Sciences Medicales.
Revue Scientifique.
Schmidt's Jahrbucher der In- und Auslandischen Gesammten Medicin.
The Practitioner.
Vierteljahreschrift fur die Prakt. Heilkunde.
Wiener Medicinische Press.
Zeitschrift f. Biologie.

The following domestic exchanges have been received:

American Journal of Insanity.
American Journal of Medical Sciences.
American Journal of Obstetrics.
American Journal of Pharmacy.
American Journal of Syphilography.
American Medical Weekly.
American Naturalist.
American Practitioner.
Archives of Electrology and Neurology.
Atlanta Medical and Surgical Journal.
Boston Medical and Surgical Journal.
Canada Medical Record.
Chicago Medical Journal.
Clinic.
Cincinnati Lancet and Observer.
Cincinnati Medical Times.
Detroit Review of Medicine and Pharmacy.
Indiana Journal of Medicine.
Medical Examiner.
Medical Herald.
Medical News and Library.
Medical Record.
Medical and Surgical Reporter.
Nashville Journal of Medicine.
New York Medical Journal.
Peninsular Journal of Medicine.
Pacific Medical and Surgical Journal.
Pharmacist.
Philadelphia Medical Times.
Physician and Surgeon.
Physician and Pharmacist.
Psychological and Medico-Legal Journal.
Richmond and Louisville Medical Journal.
Sanitarian.
St. Louis Medical and Surgical Journal.
Virginia Medical Monthly.

BOOKS, ETC., RECEIVED.

NOTE.—The foreign works in this list may be obtained through Messrs. B. Westermann & Co., No. 524 Broadway, New York.

Les Alienes, dans la Famille et dans la Maison de Sante. Etude pour les Gens du Monde. Par Madame M. Rivet *nee* Brierre de Boismont. Paris: 1874; 308 pages.

Die Physiologische Diagnostik der Nervenkrankheiten. Versuch einer Feststellung der Leitungs- und Zuckungsverhaeltnisse im Nervensysteme des Gesunden und Kranken Menschen. Von Dr. G. Burckhardt. Leipzig: 1875; 284 pages.

Der Aphasiche Symptomen-Complex. Eine Psychologische Studie auf Anatomischer Basis. Von Dr. C. Wernicke. Breslau: 1874. P. 72.

The Pathological Anatomy of the Nervous Centres. By Edward Long Fox, M. D., etc. With Illustrations. London: 1874; Pages 401.

Das Bewusstsein. Materialistische Anschauungen. Von J. C. Fisher.

Psychiatrische Zeitfragen, aus dem Gebiet der Irrenfuersorge in und ausser den Anstalten, und ihren Beziehungen zum staatlichen und gesellschaftlichen Leben. Von Dr. C. F. W. Roller. Berlin: 1874; 283 pages.

Die luetische Erkrankung der Hirnarterien, nebst allgemeinen Eroerterungen zur Normalen und Pathologischen Histologie der Arterien, sowie zur Hirncirculation. Eine Monagraphie von Dr. Med. O. Heubner. Leipzig: 1874; 239 pages.

Das Verhæltniss der Nerven zu der willkurlichen Muskeln der Wirbelthiere. Eine Histologische Untersuchung von Dr. A. Gerlach. Leipzig: 1875; 66 pages.

Etudes de Physiologie et de Pathologie Cerebrales. Par J. Luys, Medicin de la Saltpetriere, etc. Des Actions reflexes du cerveau dans les conditions Normales et Morbides de leurs Manifestations. Avec deux Planches. Paris: 1874; 196 pages.

Ueber Sinnestæuschungen. Vortrag gehalten im Rathhaussaale zu Zurich, von Prof. Dr. G. Huguenin. Basel: 1874; 34 pages.

Free Phosphorus in Medicine, with special Reference to its use in Neuralgia. By J. A. Thompson. London: 1874.

Sectionsergebnisse bei Geisteskranken nebst Krankheitsgeschichten und Epikrisen. Von Dr. H. Schuele, Arzt in Illenau. Leipzig: 1874; 248 pages.

Untersuchungen aus dem Pathologischen Institut zu Zurich. Herausgegeben von C. J. Eberth, O. O., Professor der Patholog. Anatomie. Zweites Heft. Mit zwolf lithogr. Tafeln in Farbendruck. Leipzig: 1874; 4to; 184 pages.

Handbuch der Speciellen Pathologie und Therapie. Herausgegeben von Dr. H. v. Ziemssen. Fuenfter Band. Krankheiten des Respirationsapparates. I. 714 pages. Zwœlfter Band. Krankheiten des Nervensystems. I. Erste Hælfte von Prof. Wilhelm Erb, in Heidelberg. Leipzig: 1874; 554 pages.

Klinische Abhandlungen ueber Psychische Krankheiten. Von Dr. Karl Kahlbaum. I. Heft. Die Katatonie. Berlin: 1874. P. 104.

Traite des Maladies des Reins et des alterations Pathologiques de l'Urine. Par M. Lecorche. Paris: 1875; P. 794.

Die Erforschung der Physiologischen Naturgesetze d. Mensch. Geistestætigkeit auf die Grundlage der neuesten grossen Entdeckungen, etc., etc. C. Liethorn. Breslau: 1875; P. 106.

Experimentation on Animals as a means of knowledge in Physiology, Pathology, and Practical Medicine. By J. C. Dalton, M. D., Professor of Physiology in the college of Physicians and Surgeons, New York. New York: 1875; F. W. Christern; 71 pages.

The Toner Lectures. Smithsonian Miscellaneous Collections. Nos. 266 and 279. Lecture I., On the Structure of Cancerous Tumors, and the mode in which adjacent Parts are Invaded. By J. J. Woodward, Ass't Surgeon U. S. A. Delivered March 28th, 1873. 40 pages. Lecture III. On Strain and Overaction of the Heart. By J. M. Da Costa, M. D. Professor of Practice of Medicine, in Jefferson Medical College, Philadelphia, etc. Delivered May 14th, 1874; 28 pages.

Electricity as a Restorative Agent in Narcosis and Asphyxia. By John J. Caldwell, M. D., Baltimore. (Reprint from Virginia Medical Monthly, Nov., 1874.) 8 pages.

Recent Investigations into the Physiological Functions of the Brain. By H. R. Bigelow, M. D., Hartford, Conn. 11 pages.

Remarks following Prof. A. B. Arnold's Address on Hydrophobia. By John J. Caldwell, M. D. (In Med. and Surg. Reporter, Oct. 3d, 1874.)

Report of the Health Officer of the City and County of San Francisco, for the Fiscal Year ending June 30th, 1874. Henry Gibbons Jr., M. D., Health Officer, San Francisco, 1874; 71 pages.

Nineteenth Annual Report of the Trustees of the State Lunatic Hospital at Northampton, Mass. Oct., 1874; 70 pages.

Transactions of the New Hampshire Medical Society. (Eighty-fourth Anniversary.) Held at Concord, June 9 and 10, 1874. Concord: 1874; 129 pages.

Second Annual Report of the Board of Trustees of the Northern Hospital for the Insane, Oshkosh, Wisconsin. For the Fiscal Year ending Sept. 30th, 1874. 72 pages.

Eleventh Annual Report of the Pekin Hospital for 1872. In connection with the London Missionary Society. By Jno. Dudgeon, M. D., C. M. Shanghai. Presbyterian Mission Press, 1873; 23 pages.

Twelfth Annual Report for 1873; 24 pages.

The Legal Relations of Emotional Insanity. By E. Lloyd Howard, M. D., of Baltimore. Extracted from the Transactions of the American Medical Association. Philadelphia: 1874; 12 pages.

Clinical Ureametry. By Henry G. Piffard, M. D., Surgeon to the Charity Hospital, etc. (Reprinted from the New York Medical Journal, Dec. 1874.) New York: 1874; 7 pages.

Koumiss and its Use in Medicine. By Victor Jagielski, M. D., of Berlin. Chicago: 1874; A. Arend; 32 pages.

The Polar Action of Electricity in Physiology. By John J. Mason, M. D., New York. (Reprinted from the New York Medical Journal, Dec., 1874.) New York: 1874; 15 pages.

Psychical or Physical. By C. H. Hughes, M. D. St. Louis. (From the American Journal of Insanity, for July, 1874.) 22 pages.

State of Missouri vs. Anton Holm; Murder in the First Degree. By Chas. H Hughes, M. D. (From the American Journal of Insanity, for Oct., 1874.) 10 pages.

Tinnitus Aurium, or Noises in the Ears. By Laurence Turnbull, M. D. (Reprinted from the Philadelphia Med. Times, June, 1874.) 16 pages.

On Deaf-Mutism and the Method of Educating the Deaf and Dumb. By Laurence Turnbull, M. D. (Extr. from the Transactions of the Medical Society of the State of Penn.) 7 pages.

Transactions of the Twenty-fourth Anniversary Meeting of the Illinois State Medical Society, held in the City of Chicago, May 19, 20, and 21, 1874. Chicago: 1874; 248 pages.

Tent Hospitals. Read before the American Social Science Association, May 21st, 1874. By J. Foster Jenkins, M. D. Illustrated with figures. Cambridge: 1874; 26 pages.

THE

CHICAGO JOURNAL

OF

Nervous and Mental Disease.

Vol. II. APRIL, 1875. No. 2.

Original Articles, Selections and Translations.

* Art. I.—THE RELATIONS OF THE NERVOUS SYSTEM TO THE UTERUS.

Anatomical considerations—Comparison of uterus to rectum and bladder—Neck compared to a sphincter—Anatomy of the nerves of the uterus, Frænkenhauser, Hirschfeld—Physiology of the uterine nervous apparatus, Budge, Schlesinger, Cyon, Wernich—Relation of nervous system to menstruation—Reflex action in menstruation—Nervous mechanism of menstruation, Eckhard, Loeven, Rouget, Legros—Pregnancy and labor—Why the uterus retains its contents during gestation—Why the uterine contractions are intermittent—Nervous mechanism of these processes—Practical conclusions.

GENTLEMEN: I wish now to call your attention to the nervous apparatus of the uterus and the modes of its action—more particularly with reference to *menstruation* and *labor*. I think it is possible for us to understand these interesting functions, or processes, in this way better than in any other. Of course, I cannot go at length into the anatomy of the female generative organs, or the physiology of generation. I have only time to notice, that the uterus is a hollow, muscular organ, lined by mucous membrane, and it is plentifully supplied with vessels and nerves. The muscular tissue is of the unstriped or involuntary kind, and it is subject to increase

* A lecture delivered in the Chicago Medical College, Session of 1874–5.

and decrease, according to the changes that the uterus undergoes, during and after pregnancy.

The muscular tissue predominates in the neck of the uterus, if anywhere; and certainly, no part of the womb is better, it so well, supplied with vessels, and no other part of the organ receives so many nerves. I wish to call your attention for a moment, to certain peculiarities of the uterus worthy of passing consideration, before we proceed. And first of all, its *position* and *surroundings*. It is situated with the bladder in front of it, and the rectum behind it. Then again, both these organs, like the uterus, are hollow, muscular organs; and whatever may be said of the womb, they are furnished with sphincters to prevent the escape of their contents except at certain times. Both are filled gradually with their contents, which latter are periodically or occasionally discharged. In both of these organs, their sphincters, while they remain healthy, are in a state of constant contraction, which varies in degree, and which is called muscular *tonus*. Now the question I wish to raise here is, whether we may not by something more than a mere analogy, claim for the uterus such an arrangement of parts as is observed in its neighbors. Like them, it is a hollow, muscular viscus. It also has like them, a narrow, constricted part, which certainly seems to perform the office of a sphincter for the pregnant uterus. Like them again, it expels periodically, though at longer intervals, its contents, and by the same means, viz., contraction of its muscular walls.

The bladder and rectum, as is well known, are well supplied with nerves. It is also well known that the nervous supply in the case of these organs, is not the same for their sphincters as for their bodies—indeed, that there is a more or less marked antagonism in action between their sphincters and bodies, that can be explained only by admitting a different source of nervous supply. The fact of such a difference—as it may be now regarded—is generally admitted at present by all who are acquainted with the true state of the case. I repeat, that the point I wish to raise here is, whether it is not probable that some such arrangement is also true for the womb; whether the neck and body of the womb do not have

different sources of nervous supply; and whether they are not so far antagonistic in action, that the neck may be looked upon in the light of a true sphincter. For my own part, while these points are not fully established in the affirmative, I regard them as probably true, and shall proceed at once to describe, in a summary manner, the nervous supply of the womb, and to make certain observations that may not be devoid of interest, and that may serve to render probable the points to which I have alluded.

The facts to which I shall refer, are of two kinds: they are *anatomical* and *physiological.*

I. *Anatomical.*

The subject of the nervous supply of the uterus, has been for a long time, an interesting one among anatomists. Several years since, to go no farther back, Dr. Robert Lee, of London, made some elaborate dissections of the uterine nerves, and as a result, published certain very interesting memoirs with illustrations, that at the time, attracted much attention. Some time afterwards, Jobert in France, also published the results of his investigations, which differed in some respects from those of Lee, especially as relates to the question as to whether the nerve-fibres undergo changes in number and *size* during the pregnant state. This latter publication gave rise to a rather warm discussion, participated in by various anatomists. Among the other works produced, partly as a consequence of the interest thus excited, there are two that deserve special mention on account of the thoroughness and care with which the investigations were conducted, the results of which they contain. I refer now to the works of Frænkenhauser * and Hirschfeld. † In the anatomical description which follows, I shall draw from these authors,

* *Die Nerven der Gebaermutter und ihre Endigung in den glatten Muskelfasern. Ein Beitrag z. Anat. u. Gynækol.* V. Dr. F. Frænkenhauser, Jena, 1867. Fol. 84 s. u. 8 Taf. col. abbild.

† Hirschfeld's Memoir, communicated to the Biological Society of Paris, and published in September, 1852, in its transactions, and a more extended paper on the same topic presented later, and found in the *Memoires de la Societe Medicale de Varsovie.* The results of the whole will be found at page 370 of his splendidly illustrated work on the Nervous System—*Traite et Iconographie du systeme nerveux*, etc. Paris, 1866.

with reference also to my own dissections made some years since.

Situated just below the diaphragm, at the point where the aorta passes through it—and on either side of the aorta, at the point whence the cœliac axis is given off—behind the stomach, and in a circuit of three or four inches in diameter, is the *solar plexus*—the greatest nervous plexus in the body.

On either side of the aorta, and in the heart of either lateral half of this plexus, we find at least one large ganglion, the right being usually the most voluminous—the *semi-lunar ganglia.* These ganglia are the largest belonging to the sympathetic nervous system. This immense and important plexus is composed chiefly of the sympathetic nerves belonging to the superior limit of the abdomen, but it receives great accessions from the thoracic part of the sympathetic nervous system—especially the splanchnic nerves of the two sides, and branches from the thoracic aortic plexus. It receives besides, large contributions from the two vagus and phrenic nerves—especially the right vagus and phrenic. This plexus is, therefore, formed not only by the abdominal sympathetic, but also from almost the whole length of the thoracic, if not the cervical portion of the same nerve, and also by certain of the spinal nerves from the lower dorsal region up to the summit of the medulla oblongata.

From this it will be seen that its connections above the diaphragm are very extensive and important. But its connections downward are equally important, as we shall shortly see.

The solar plexus gives off a large number of subordinate plexuses, which, as a rule, follow the abdominal aorta and its branches. These plexuses, as you know, take the names of the arteries they accompany. Hence we have the gastric, hepatic, splenic, superior mesenteric, renal, inferior mesenteric, spermatic, abdominal aortic, and other plexuses. All these plexuses are reinforced by the addition of ganglia to them, and many of them by other fibres from the lumbar, and lower down, the sacral ganglia of the sympathetic.

I wish, however, to call your attention to such of these subordinate plexuses as furnish nerves to the uterus. And first, I would mention that the renal plexus gives off a number of

fibres, that in the male accompany the spermatic, and in the female the ovarian arteries, contributing to form a plexus in either case, which takes the name of the artery it accompanies. Besides the nervous filaments which the ovarian derives from the renal plexus, it receives large numbers of fibres from the lumbo-aortic, the superior mesenteric, the hypogastric (superior), and a few filaments at least on the right side from the plexus of the vena cava inferior. These nerves proceed to the ovary, which is richly supplied with them, and they are also distributed to the sides and body of the womb, and as they pass downward, they anastomose with the uterine nerves (so-called), that are sent upward from the hypogastric plexuses.

The solàr plexus gives off a large plexus to follow downwards the abdominal aorta, and which constitutes partly the lumbo-aortic plexus. This plexus extends from the origin of the superior mesenteric artery, downwards to the point of division of the aorta into the two common iliacs. The nerves which form this great plexus do not come alone, or even chiefly, from the solar plexus. It receives nerves from all or nearly all the lumbar ganglia of the sympathetic (internal branches), and from some other minor sources; among which may be included, probably, branches from the corresponding lumbar spinal nerves. This plexus contains many ganglia, some of which are of large size. When it is traced downward to a point a little below the bifurcation of the abdominal aorta, corresponding to the sacro-vertebral prominence, this plexus divides into two great branches, which pass downwards and forwards by the side of the rectum and bladder in the male, and the rectum, vagina and bladder in the female. These are the great hypogastric plexuses, which are the chief sources of nervous supply to the viscera within the pelvis. They are not composed alone of the plexuses which descend into them from the lumbo-aortic above, though this is their chief source. A large contribution comes from the inferior mesenteric plexus, which joins the lumbo-aortic contribution at the sides of the rectum.

Another comes from the sacral ganglia, which send very many branches to the hypogastric plexuses. Then again, the spinal nerves of the pelvis which form the great sacral plexus,

give off many branches to the hypogastric plexuses. This, according to Cruveilhier,* is especially to be remarked of the fourth sacral (spinal) nerve, which gives off several large branches that are to be traced directly to the hypogastric plexuses, right and left. This supply of cerebro-spinal nerves to the uterus from the fourth sacral nerve, would seem to place the spinal centre of the womb in the human being in a part of the cord corresponding to that established by physiological experiments, as the *genito-spinal centre*, by Budge. I will shortly refer to these experiments. These great plexuses, as I have already said, lie on either side of the rectum and of the vagina at its upper limit, and also on either side of the neck and lower portion of the bladder. They include very many large ganglia, and send a great many nerve-fibres to the neck of the womb, some of which appear to be distributed to the surface and muscular tissue of the neck, as was observed more particularly by Frænkenhauser, while others appear to penetrate deeper, passing probably to the mucous membrane of the cervix. Other branches pass upward higher than the neck to the lower part of the body of the womb; perhaps farther when they anastomose with the nervous twigs contributed by the ovarian plexus. The body of the womb also receives filaments directly from the hypogastric plexus. Anyone who examines the case, will see that the neck is every way better supplied by nerves, than is the body of the womb; and it is also more vascular. These two facts will enable us to partly understand why the cervix is more frequently the seat of disease, than is the body of the womb. This fact of the partial pathological independence of the neck of the womb, has impressed itself on our literature, as may be seen in the special treatises on the "Diseases of the Cervix Uteri."

But to sum up the sources of uterine nervous supply. They have a double origin:

1. *Cerebro-Spinal.*—Probably

A. From the five or six last intercostal nerves, which by reason of contributing branches to the two great splanchnic nerves, take part in forming the great solar plexus, which, as

---

* *Traite d'Anatomie Descriptive, etc.* Quatrieme Edition. Tome III, p. 644.

we have seen, sends a large number of fibres, but more or less indirectly, downward to the uterus.

B. From all the lumbar and sacral nerves, which give off anastomosing branches to all the corresponding ganglia, from which branches are given off freely to the aortic and hypogastric plexuses, and hence to the uterus.

C. From the vagus of each side, but especially the right, which divides at the level of the pylorus into two branches, one of which passes to the posterior surface of the stomach, and the other goes to the solar plexus. Some of the fibres of this nerve may possibly reach the uterus, though this is doubtful.

D. The right phrenic nerve. The same remarks may be made concerning this nerve as have been made in relation to the vagus or pneumogastric.

2. *Sympathetic Nerves.*—These are derived from:

A. The bifurcation of the abdominal aortic plexus, at the level of the sacro-vertebral angle.

B. The inferior mesenteric plexus.

C. The renal plexus.

D. The lumbar ganglia.

E. The sacral ganglia.

These nerves taken altogether contribute to form two plexuses, the ovarian and the hypogastric, that are distributed as already described. (*Hirschfeld—Frænkenhauser.*)

These nerves, after they have entered the substance of the uterus, after all the controversy to which this has given rise, appear to be subject to increase in the size of the fibres during the pregnant state, and a decrease after delivery.

From this outline of the anatomy of the nerves of the uterus, you may gather:

1. That the uterus is bountifully supplied by nerves, both from the sympathetic and cerebro-spinal nervous systems, and that its nervous connections with other organs are both numerous and important.

2. That there is some anatomical justification for supposing that the neck and body of the womb have a somewhat different source, as regards nervous supply—the one being supplied wholly by the hypogastric, and the other, at least partly, by the ovarian plexuses.

II. *Physiological.*

For a long time it has been regarded as probable that the spinal cord has a direct influence on the organs of generation. But it was Budge,* of Greifswald, who probably made the first definite experimental observations in regard to the influence of the lower part of the spinal cord on the motions of the generative organs. He laid bare the spinal cord, in a male rabbit, and at the same time exposed the testicle, the vas deferens, and seminal vesicle of one side. By irritating the exposed lumbar portions of the cord, he found, in numerous experiments, that irritation of that part which corresponds to the fourth lumbar nerve, produced active motions in the vas deferens and seminal vesicles, the motions beginning at the testicle, and being propagated toward the corresponding seminal vesicles. The irritation of no other part of the cord produced such effects. These observations on the male, which have been often repeated with the same results, have also been made on the female, and movements of the uterus have been excited from a corresponding point of the cord.

These earlier experiments of Budge have since been controverted to a certain extent by Kupressow, but they have been re-affirmed by Budge, so there can be but little, if any, doubt that a genito-spinal centre does exist in the lower part of the cord, which may be regarded as the immediate spinal nervous apparatus of the uterus, as well as of the male sexual organs. And then why hesitate to admit that we have such a centre in the cord, even if the experimental proofs of its existence are not perfect, when we admit respiratory, cardiac, vesical, anal and other centres?

Neither the experiments of Schlesinger, (*Stricker's Medicinische Jahrbucher*,) Cyon, and others, which point to a higher situation for a uterine centre, nor those of Wernich, drawn from a consideration of the action of ergotine, when injected into the veins, really militate against this position, as I may have occasion to show before I close this lecture. I have not, by any means, referred to all the facts, anatomical and physiolog-

---

* *Ueber das Centrum genito-spinale des N. Sympathicus.* V. Prof. Budge in Greifswald. *Virchow's Arch. f. Path. Anat. u. Klin. Med.*, Band XV. s. 115–126.

ical, especially recent ones, which have a bearing on this subject. But I know of none, however recent, that would militate seriously against the partly hypothetical propositions I will now lay down. They are as follows:

1. There is probably in the lower part of the spinal cord one or more nervous centres, from whence the nerves proceed that more or less directly supply the uterus.

2. In the human being there is some anatomical ground for believing the genito-spinal centre to be at or near the point of implantation in the spinal cord of the fourth sacral nerve.

3. There are certain reasons, chiefly inferential in kind, for thinking that the genito-spinal centre consists of two or more subordinate centres, which have different offices, or are related to parts of the uterus anatomically different.

But on this somewhat indefinite anatomical and physiological background, I wish to offer some special remarks on the functions of *menstruation* and *labor*, as I promised to do in the beginning of this lecture. Without farther preliminary, then, I will direct your attention to menstruation as it occurs in the human subject.

I. *Menstruation.*

The menstrual flow, as you are aware, occurs as a rule once every twenty-seven or twenty-eight days, or, in other words, once every four weeks, if the case is according to the normal type, extending from the time the menstrual history of the female opens until it is closed, unless interrupted by pregnancy or child-bearing.

Of course this is only a statement of the general rule. There are many exceptions to it, both pathological and, apparently, physiological. I will not now, or at all, name these exceptions, because many of them are known to you already. This menstrual flow, appearing once a month, lasts from a few hours to several days, and then disappears, to re-appear again, in most cases at a certain regular period. The fluid is usually rather thin and bloody, and it contains more or less mucus. The blood it contains does not spontaneously coagulate. Where does this bloody fluid come from? From the mucous membrane lining the inside of the womb. That membrane, or rather its vessels, at the time when the menstrual discharge

begins to appear, is now known to be in a hyperæmic or congested state. The blood oozes out from the membrane or its over-distended vessels. But let us pass to the condition of the uterine vessels, and try and ascertain, if we can, why it is that the hyperæmia occurs, which is the immediate cause of the discharge. If the congestion that is observed in the uterine vessels did not occur, the periodical discharge would not take place from the womb.

That the congestion comes round once a month, or at least as often as the menstrual discharge, there can be no question, I suppose. Now how is the congestion brought about, and especially periodically?

Is it produced by some cause limited wholly to the uterus, and which acts directly on the vessels, or is it rather to be referred to some irritating, or at least exciting cause, operating from a distance, through the medium of the nerves of the uterus? After having studied this subject over pretty thoroughly, I have no hesitation in deciding in favor of the latter view; and after what I have said to you in relation to the mechanism and mode of action of the vaso-motor nervous system, I do not think I will experience much difficulty in making you understand how the congestion may occur. You remember how it was decided, that the peripheral, vaso-motor nervous apparatus, consists of a great number of small ganglia, situated on, or in, or near, the walls of the muscular vessels. These small ganglia were believed to receive fibres from, and to give off fibres to, the vessels. Back of the small ganglia of this first class, other ganglia were said to lie, which were supposed to receive impressions from the vessels, probably through the medium of the first mentioned ganglia. But both the classes of ganglia were supposed to act in a reflex way. They received impressions directly or indirectly from the vessels, and as a consequence (reflex), sent back impressions to the muscular coat of the vessels, which caused the muscular tissue to remain in a state of constant contraction, or *tonus*, the result of which was to resist the entrance of blood into such vessels as had such action. Besides these nerves, certain others were believed to emanate more particularly from the spinal cord, to terminate peripherally in these already described peripheral

ganglia, instead of terminating in the walls of the vessels. The action of these last mentioned nerves (vaso-dilators) on the ganglia in which they terminated, was believed to be *inhibitory*, or an action of *arrest*, such as to prevent, in varying degrees, the action of the peripheral vaso-motor ganglia, which ordinarily, act in a reflex way in response to impressions received from the vessels themselves. By means of this inhibitory action I have described, the *tonus* of the vessels is diminished, and as a consequence, the vessels expand under the pressure of the blood—expansive pressure—and hence you have a congestion, which it can be easily seen, might vary in its intensity according to the circumstances of each case. In the present case, according to this mode of viewing it, all we have to suppose is, that some agent shall act on the centres in the spinal cord, from whence the vaso-dilator nerves for the vessels of the uterus proceed, and the congestion is produced. For my own part, I doubt not such is the mechanism and its mode of action, in producing the congestion of the uterine vessels, which must precede, and be the immediate cause of the menstrual discharge.

But the case under consideration is possibly not so simple as I have stated it to be. A number of physiologists have made most careful examinations of the tissues called *erectile*. Among them I may mention Eckhard, Loeven, Rouget, and Legros. You know there are certain parts of animals, both male and female, that when excited, moderately, become swollen and turgid with blood, and firm to the touch. The sensibilities of such parts, and indeed all their vital activities, appear to be exalted while in a state of "erection."

The most peculiar phenomenon as regards this state, is the sudden and remarkable accumulation of blood in the erectile tissue, at the time, and as the immediate cause, of the erection. How shall we explain it? The earlier researches of Eckhard pointed out the existence of certain peculiar nerves distributed to the erectile tissues, called the *nervi erigentes*. Irritation of these nerves was followed by an erection. But the researches of later physiologists have been directed rather to the discovery of the peculiar mechanism, in the tissue itself, by means of which the congestion is immediately produced.

As a final result, I may state that there is reason for thinking the congestion to depend on pressure, exercised on the veins or sinuses of this tissue by certain bands of muscular fibres, which in great measure leads to closure of the veins, and hence the accumulation of blood, inasmuch as the arteries still convey it freely to the tissue.

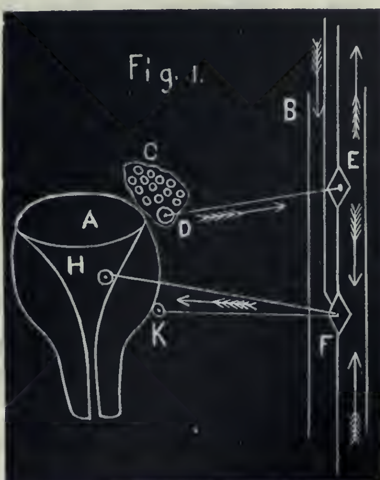
These muscular bands are supplied by nerves, in much the same way as the vessels; and as it would appear from centres located in the spinal cord. And these are the *nervi erigentes* of Eckhard.

Now Rouget has demonstrated the existence of erectile tissue about the ovary, and along the side of the uterus, between the broad ligaments of the uterus. It seems to be his opinion, that the gradual filling of the vessels in this region, produced in the same way as that by which the vessels are filled in other erectile tissues, is the cause of the menstrual discharge. Hence, I said to you, that the case may not be so simple as I stated it at first. But though this view of Rouget's should be true, it does not necessarily exclude the one I have offered you. On the contrary, in spite of the ingenuity of the views of Rouget, I am inclined to look upon it as the least probable of the two. But both may be true, and both alike refer back to the spinal cord, as we progress in our examination in a regressive order. No matter whether the congestion is produced by the action of the so-called *vaso-dilators* on the peripheral, vaso-motor apparatus, or by direct or indirect action on the muscular apparatus of the erectile tissue of Rouget—we must in either case refer to an influence transmitted to the parts in question from the spinal cord.

This leads us back, probably, to a genito-spinal centre in the cord—*vaso-motor*. But as we have seen before, no nervous centre can act of its own motion, or *originate* action, *de novo*. They must be *excited* to action. This being so, we must look about for suitable excitant influence to act on these centres, that they may act on the vessels so as to cause in one way or another the congestion. Whatever this stimulus may be, it must have certain peculiarities, if we may judge by the phenomena we behold.

It must, as a general rule, act slowly. It must also act peri-

odically during a certain time in life. Has any such peculiar periodical cause for the excitement, that might lead in the way we have supposed to the congestion, been discovered? There is such a cause for periodical irritation or excitement, and that is the development in, and escape of the Graafian vesicle from, the *ovary*. This as a rule, is the centre or focus of irritative impressions, which through the sensory nerves with which the ovaries are so liberally supplied, are conveyed during many days; the gradually increasing excitant influence, which in a reflex way, as you can readily conceive, might lead to the congestion, that should reach its height at the time of the escape of the ovum from the ovary, when, if conception is to occur, there may be the maximum of a blood supply present, to furnish one of the essential conditions for starting the ovum on its career of intra-uterine development. But this subject may be better understood by reference to the sketch which I produce.



Here let *a* represent the uterus, and *b* the spinal cord in the lumbar region. Let *c* represent the ovary, and figure *d* an enlarged Graafian vesicle just ready to escape from the ovary. Now you know that the development of these Graafian vesicles is attended with no small degree of nervous excitement. The ovary and even the uterus in the vicinity of the growing vesi-

cle, becomes congested and irritable, and these phenomena increase, until the ovary gives way at the point against which the ovum presses. By a reference to the sketch you will see certain lines which are drawn from the ovary to the spinal cord. They represent sensory or afferent nerves going to a centre in the spinal cord at *e*. From this centre you see a line drawn upward, which conveys impressions from the centre *e* toward the brain. Another line passes downwards to another centre in the cord at *f*, which is the uterine vaso-motor centre. This centre gives off fibres (vaso-dilators) which go to the intrinsic vaso-motor apparatus of the muscular vessels of the womb.

The irritative or incident impression in this scheme starts at *d* and passes to *e*, and thence to *f*, from whence it is reflected back to *a*, or rather its vessels, either as I have supposed to *h*, or according to the view of Rouget, at *k*. But this is not all. If you will again look at the sketch, you will perceive that the centre *f* has two other lines entering it, one from above and the other from below. The one from above is the track along which impressions are supposed to pass from regions above the centre, as from the mammary glands, or from the brain, comprising visual, auditory, olfactory, emotional and moral influences, that may affect menstruation, or the action or condition of the circulation in the generative apparatus.

The other line represents the channel along which influences may come, whether from the outer genital apparatus or the lower limbs. For example, we will suppose a female at the beginning of the menstrual period to step out on the cold, damp ground, with the feet insufficiently protected. The menses suddenly cease. How can we rationally explain this state of things? It seems to me that it can be done by supposing that the violent impression made on the sensory nerves of the lower extremities is transmitted either directly or indirectly to the excited and excitable vaso-motor centre for the uterus at *f*, that is located in the lumbar portion of the cord, and produces in a reflex way a sudden contraction of the uterine vessels, and hence removes the condition on which the menstrual flow immediately depends. This view is supported by many analogous facts that are well understood, and which you may remember my having already referred to in the course

of my lectures on the vaso-motor nervous system. Here I would be glad to pause and apply this view of the mode in which menstruation occurs, to the explanation of many facts met with in clinical experience; but I have no time to devote to such a purpose. Before I dismiss this branch of my subject, I must take the occasion to say that the opinions I have placed before you, hypothetical as they may be in some respects, nevertheless have, as already remarked, the support of many striking analogies, and are in agreement with, if they are not confirmed by, what we know at present of the nervous system and its modes of action; and apparently explain at least most of the facts in regard to menstruation in a rational way.

As regards the *periodicity* of the menstrual discharge, we seem to have a sufficient reason for it in the periodical recurrence of ovulation. But why should the Graafian vesicle only mature once every four weeks, as a rule, in the unimpregnated female of the human species? This is a question which has never been answered in a satisfactory manner, so far as I know.

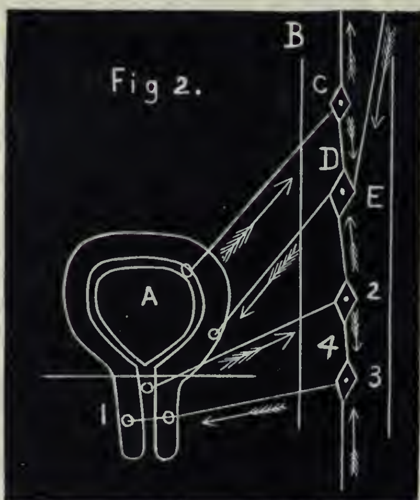
II. *Pregnancy and Labor.*

In regard to these cases, there are two principal points to which I desire to direct your attention, with the purpose of trying to explain them. They are, *first*, as to why the uterus continues to tolerate its contents for so many months, before it finally evacuates them; and *second*, why the contractions of the womb during labor are, as a rule, intermittent.

1. But first, as to why the uterus tolerates its contents so long. Why are they not expelled at any time, as is indeed sometimes the case in miscarriages? In my judgment, it is for the same cause as that which prevents the rectum and bladder from evacuating their contents except occasionally.

There is, however, this difference, among others, to be observed between the organs above mentioned and the uterus. The actions of their sphincters at least are normally under the control of the will to a very considerable extent. Happily this is not true for the uterus. But though it is cut off in great measure from voluntary, it is yet more or less subject to emotional influences. But this difference does not invalidate the

position I have assumed. The uterus retains its contents as it does because the neck practically performs the office of a sphincter. It retains them as long as it does, because it requires, as a rule, the whole period of pregnancy to obliterate the neck in the progressive expansion of the uterus. When it is obliterated as a neck, then the uterus and its contents settle down in the pelvis, and the time for it to expel its contents is at hand. The time required under ordinary circumstances for the obliteration of the cervix is the period of gestation. Of course the uterus may evacuate its contents earlier, on account of disease, or forcible dilatation of the neck, or unnatural stimulation of the body of the uterus. But I can convey my opinions to you better by a reference to this sketch No. 2 than in any other way.



Let *a* represent the uterus, say at the end of the second month of pregnancy; and *b* the lumbar portion of the spinal cord. Then let *c* represent the centre in the cord for the sensory nerves of the womb. The line passing between the uterus and this centre may indicate the sensory nerve fibres. The sensory spinal centre in the sketch is connected by *d* with *e*, the centre for the motor nerves of the womb, which are indicated by the line drawn between the points named. Impressions made by the fœtus or contents of the womb on the

mucous membrane lining the womb, or its other parts, are supposed to be transmitted to *c*, and thence to *e*, and finally to the muscular tissue of the womb, which contracts under the influence of the reflex motor impulse. Now, what prevents the womb from prematurely expelling its contents, through the agency of this nervous mechanism? The answer, is that it often does so in miscarriages. But the chief reason is to be found in the structure and action of the neck of the womb.

The cervix of the uterus has considerable length, and is distinctly muscular in structure. Before the solid contents of the womb can be expelled, the obstacle which the constricted and irritable neck is, must be first overcome. Why is it not overcome, or rather, what maintains the muscular walls of the uterus quiet? I would answer these questions in the following manner:

Let 1 (in Fig. No. 2) indicate the neck of the womb, and 2 the sensory centre for the neck in the lower part of the spinal cord, and 3 the motor or tonic centre for the same, connected together by nerve-fibres at 4. Any impression made on the neck, as by a contraction of the body of the womb, which should impel its contents against it, would be transmitted to 2, and reflected by 3, along the motor nerves of the neck, so as to excite contractions in it. In this way, the moment the body of the uterus begins to contract, the neck contracts, and so increases the obstacle to expulsion of the uterine contents. But this is not all, nor indeed the most important point to be noticed.

This sensory centre of the neck is supposed to be connected also, with the motor centre for the body of the womb, so that the impressions received by 2 are not only sent to 3, but to *e*. But why to *e*? Simply for *inhibitory* purposes—or to *arrest* its actions more or less gradually.

As a rule, which has its exceptions, so long as the neck remains unobliterated, expulsive contractions of the body of the uterus cannot occur to any marked extent, without (1) rousing contractions of the neck, as I have supposed; and (2) causing, especially if pain is excited in the neck or soft sensitive parts, inhibitory action, or an action of arrest, exerted by the centre 2 on *e*, the latter being the

motor centre for the body of the womb. If it were not for this inhibitory action, exerted by the sensory centres for the neck and vagina, etc., strong and long-continued contractions of the uterus, might during labor, lead in most instances to damage of the soft parts. But by reason of this provision in the uterine nervous apparatus, that may be compared to that which exists, through the medium of the nervous system, between the heart and peripheral vascular system, such accidents are usually, though not always, avoided. This is why the uterine contractions are periodical, or rhythmical.

That the explanations, hypothetical as they may be, of the tolerance by the uterus of its contents during the period of gestation, and of the periodical or rhythmical action of the uterus during the progress of labor, are probably the true ones, may be rendered more apparent by the consideration of certain facts that I will now briefly mention, and in this way close my lecture.

1. I believe it is a fact, that until about the time of natural period for labor to begin, the neck of the womb continues, though much shortened, to exist as a neck. But it is well known that just before labor begins, often some days before, the uterus and its contents settle down in the abdomen, so that the patient can breathe more freely than for some time. There is more space just below the diaphragm than did exist. Now, how shall we explain this? It seems to me it can be explained very easily, on the supposition that the time has come when the neck has begun its final relaxation, prior to labor. This fact then, if it is a fact, indirectly confirms my view.

2. Then the way the neck acts during labor, seems agreeable to, if it does not confirm, my view. As long as the body of the uterus remains quiet, the neck, as any one can demonstrate for themselves, will continue relaxed. But the moment the body of the womb contracts so as to stretch the neck or mouth of the womb, that moment does the neck respond by contracting, rigidly, and it continues in this rigid resisting condition until the contractions of the body cease.

3. Then again, that the resistance offered by the sphincter-like action of the neck of the womb, is the chief cause for the uterus retaining its contents until the period of gestation is

completed, will be rendered probable, when we consider the effect of artificial dilatation of the neck, as in the use, for instance, of Barnes' dilators. Immediately labor comes on. But why? I know there are other modes of explanation of this case; but I believe, nevertheless, the one I have given you, worthy of consideration. At any rate, we can easily see in accordance with my view, why labor should occur when the neck is artificially dilated.

4. Then again, we frequently find cases in which the bladder, partly filled with urine, is caught by the head of the child against the os pubis, in such a way the urine cannot be voided, and hence there is severe pain at each contraction. But the labor does not progress. The contractions of the womb appear to be futile—powerless. I suppose every physician of much experience must have met with cases of this kind. In such an instance, when the bladder is emptied by using the catheter, the "pains" begin to return with power, and the labor which had made no perceptible advance for hours, is sometimes completed in a few minutes. Now, how shall we explain this case? Very easily, as it seems to me. The painful impression made by pressure on the distended bladder, is conveyed back to the appropriate sensory centre, which we will suppose is 2, and from thence, an impulse is sent to *e*, which by an action of arrest, inhibitory action, prevents efficient contractions of the body of the womb. By this means, we have a safeguard, as a rule, against serious damage to the soft parts within the pelvis. But I wish you to notice, that the views I have placed before you, are commended by the natural and satisfactory manner in which it explains the periodicity of the uterine contractions, and especially inefficient contractions, caused by painful pressure on the distended bladder.

5. The views I have set before you also derive support from such cases as the following:

Brachet relates a case of a paraplegic woman who became pregnant, but whose child had to be artificially delivered, simply on account of inefficient uterine contractions. And also, a case is related by Nasse, in which a female, during pregnancy, suffered a dislocation or fracture of the third and fourth

cervical vertebræ, with consequent motor and sensory paralysis of all the parts below the seat of injury. The child was, nevertheless, naturally, and of course painlessly, born afterwards. I would explain the first case by supposing the organic seat of the paraplegia to have involved the uterine centres in the cord, which I have mentioned. The second case I would explain by supposing the organic seat of the paraplegia not to have involved the uterine centres.

I know other modes of explanation have been offered as to why pregnancy is terminated naturally at the period of nine months, as, for example, on account of fatty degeneration of the placenta. But I am inclined to find the true explanation in the direction I have pointed out to you.

6. But last of all, I would mention the action of chloroform in labor. My experience with its use, which has been considerable, is in its favor. But in what way does it prove beneficial? Chiefly, as it seems to me, by diminishing the sensibility of the sensory centres in the cord for the neck of the womb, and other parts below it, and in this way diminishing the inhibitory action I have been describing to you.

But I must bring this lecture to a close, much before I am done citing facts and analogies in support of my views,* and before I have even begun to speak of the real or apparent difficulties of the positions I have assumed. I do not claim novelty for them, but only a certain measure of scientific and practical interest. I may say to you, that it is my intention soon, to put the views I have expressed in this lecture to careful experimental test.

---

* See an abstract in the Periscope of the present number, of an interesting observation reported by Goltz, in the December No. of *Pfueger's Archiv*, which partly confirms my views.

Art. II.—NITRITE OF AMYL IN EPILEPSY: EXPERIMENTAL AND CLINICAL OBSERVATIONS.

By James H. McBride, M. D.,
Assistant Physician to the Northern Hospital for the Insane, Oshkosh, Wisconsin.

IN the *Philadelphia Medical Times* for April, 1872, we find the notes of a case of epilepsy reported by Dr. S. Weir Mitchell, in which the nitrite of amyl had produced good results.

In the West Riding Lunatic Asylum Medical Reports for 1873 is an article by Dr. J. Crichton Browne, on the "Nitrite of Amyl in Epilepsy," in which he gives details of cases where the nitrite had been of great benefit, and he offers many valuable suggestions in regard to the nature of epilepsy, and the physiological action of amyl.

Before proceeding to give the results of experience in this institution with the nitrite of amyl, it may not be unprofitable to consider some of the theories that have been and are now held in regard to the nature of epilepsy.

Solly held that the epileptic seizure was due to arterial congestion of the brain, from increased action of the heart occurring simultaneously with paralysis of the cerebral arteries. He said that the intense congestion of the brain causes a rapid increase in the generation of nerve force, which being transmitted by the nerves, from its quantity and excess causes excessive action of the muscles.

Marshall Hall's theory has the merit of being ingenious, and may be thus stated: An irritation of the medulla, causing contraction of the muscles of the neck and spasm of the glottis. By the contraction of the muscles of the neck there is compression of the larger cervical veins, and from the spasm of the glottis, asphyxia. From the resulting venous congestion of the brain and the asphyxia there occur unconsciousness,

insensibility and convulsions. Although this theory is not now generally adopted, yet it is worthy of consideration as the opinion of an original investigator to whom the profession is indebted for many valuable suggestions.

To him is due the credit of suggesting that all paroxysmal nervous affections "are one and the same disease, differing only in degree," and he also first pointed out the resemblance of the symptoms of strangulation to those of epilepsy.

It is a well-known fact that animals and human beings dying by strangulation expire in general convulsions similar to those of epilepsy. Instances are on record in which strangulation has given rise to epilepsy.

Kussmaul reported the case of a girl who hanged herself and who was restored to life with difficulty; she had frequent epileptic seizures for some weeks afterward.

Burrows held that the epileptic seizure was due to a condition of cerebral anæmia, the withdrawal of the pressure which the blood usually exerts upon the brain causing a disturbance of function.

Dr. J. Hughlings Jackson holds that the seizure is due to a discharge of nerve force, though he thinks there may be disturbance of the brain circulation also. He says that the "normal function of nerve tissue is to store up and expend force." * * * "There are but *two kinds* of alteration of function from disease." * * * "On the one hand loss of function, and on the other over-function" (not better function). "In the former, nerve tissue ceases to store up and therefore to expend force. In the latter more force is stored up than in health, and more is therefore expended. The nerve tissue is highly unstable." His definition of epilepsy is as follows: "Epilepsy is the name for occasional, sudden, excessive, rapid and local discharges of gray matter." He says, "then a sneeze is a sort of healthy epilepsy," and that "a paroxysm of subjective sensation of smell is an epilepsy, as much as is a paroxysm of convulsions; each is the result of sudden local discharge of gray matter."

Many other theories of epilepsy might be mentioned, but those given, together with one or two others to be noticed, will suffice for my purpose.

We are indebted to the researches of Van der Kolk for more correct views of the nature of epilepsy, and it is chiefly through his investigations that the medulla has been shown to be the seat of the epileptic affection.

A knowledge of the anatomy and physiology of the medulla seems to confirm this view, that the epileptic affection has its seat in the medulla, and that it is due to a morbid excitability of this organ.

The spinal cord is composed of two equal halves connected by a delicate gray commissure. Each half is therefore, to a certain extent, independent of its fellow, and capable of separate action. By this arrangement unilateral movements of the extremities are provided for, and not only this, but unilateral irritations exercise a unilateral effect upon the power of motion.

In the brain there is a similar arrangement; it is an organ composed of two equal halves—in fact, we possess two brains capable of united or separate action. So far as motion is concerned, either half is capable of acting independently of its fellow; and, by disease or injury, there may be loss of function of one side, while the other continues to act with its accustomed vigor. But not alone in motion is the brain capable of sustaining a double action, for in the process of thought this is equally true and more strikingly apparent.

In consequence of this twofold arrangement, we can address our thoughts to two different subjects at the same time; we can converse upon one subject and write upon another; or one-half of the brain may engage in flights of fancy, the other half remaining a quiet listener; or it may be, corrects the unreal suggestions of its romancing neighbor.

In the medulla, however, is an arrangement which particularly distinguishes it from either the brain or cord. It is the bond of union between the brain and spinal cord, the centre from which radiates the whole nervous system, and through which proceeds every movement that animates our bodies. The two halves of this organ are intimately connected by a system of transverse arched fibres, some of which, according to Van der Kolk, surround it, others arise internally, and passing from side to side effect a most intimate union of all its parts. It is by this arrangement, and from its abundant sup-

ply of ganglionic groups or nuclei for sensitive and motor nerves, that the nerves which take their origin from the medulla are capable of exciting bilateral reflex phenomena in different groups of muscles, of which the voice, movements of the tongue and respiratory movements are instances. The medulla is also abundantly supplied with blood-vessels. In fact, this is one of its distinguishing features; nowhere else in the nervous system is there so great a supply of arterial blood. It follows, from its complex and delicate organization, that the vital actions are here very great, and that by preference reflex movements take place here.

From pathological considerations, also, the medulla may be regarded as the principal reflex centre. It is, perhaps, from a morbid condition of this organ, that all paroxysmal nervous affections spring. The globus hystericus, which is a peculiar sensation in the throat, implies an irritation of the medulla, operating through the vagus nerve.

It is also probable that many of the prominent symptoms of hydrophobia and tetanus find an explanation in an exalted excitability of the medulla.

The convulsions of teething of infants can be explained on the same ground. In them the tissue changes take place most rapidly and the vascularity is also greatest, and, to use a hackneyed phrase, all the vital actions are intense. Hence, from the irritation of teething they have convulsions, though later in life, when the nervous system is less susceptible to external impressions, the most violent attacks of toothache or neuralgia are not sufficient to produce convulsions.

Dr. Brown-Sequard made some interesting experiments bearing upon the subject of convulsions. He found that by certain injuries to the spinal cord epileptic convulsions were developed after a lapse of three weeks. The convulsions sometimes occurred spontaneously, but they were most readily excited by a slight irritation of the skin of the cheek, that part which corresponds to the distribution of the second and third branches of the trigeminus. The first convulsions were limited to the muscles of the face; later in the course of the experiments, they extended to the muscles of the chest and abdomen, and lastly, the extremities participated. The interesting

points in these experiments are, that the convulsions did not occur until three weeks after the infliction of the injury; that is, not until the diseased process engendered by the injury had extended along the cord to the medulla. Secondly, the convulsions were most readily excited by the irritation of a nerve which arises in the medulla; and lastly, the muscles convulsed were in the order in which they are most intimately connected by nervous supply with the medulla.

This corresponds with what is observed in epilepsy: the muscles first convulsed are those which are supplied by nerves arising in whole or in part from the medulla; among these nerves are the facial, hypoglossal, accessory, etc.

In more violent attacks the muscles of the chest and abdomen are convulsed, showing that the lateral columns of the cord (which arise in the medulla) participate in its morbid action. Lastly, the extremities are convulsed, indicating that the anterior columns (which, under the name of the corpora pyramidalia, pass through the medulla) are involved. (Van der Kolk.) Dr. Brown-Sequard also observed that in these cases of artificial epilepsy from injury of the cord, an irritant applied at or near the seat of injury would not excite convulsions, and that irritation of the medulla was alone sufficient to bring them on.

We have seen that the medulla is the centre for a multitude of reflex phenomena, and that for these it possesses an exalted capability; that it is also the centre for respiration, for circulation, and for bilateral movements. We know that on irritating a peripheral nerve (the trigeminus) that the reflexion is transmitted downwards, that is, towards the medulla; and that on irritating a nerve proceeding from the cord, the reflexion is transmitted upwards, that is, towards the medulla.

These facts appear to demonstrate that the medulla is the centre for bilateral movements, and that it is also the situation where bilateral convulsions originate.

The brain circulation will next claim our attention, as it is under the control of the medulla, and is of course affected by morbid conditions of this organ.

The question as to whether the quantity of blood within the cranium is susceptible of increase or diminution, whether it is

not a constant quantity remaining always the same, was finally settled by the celebrated experiments of Donders and Burrows. Donders removed a portion of the cranium of a rabbit, and inserted a piece of glass, air-tight. By this means, after section or irritation of the cervical sympathetic, or by compression of the arteries of the neck, changes in the brain circulation were observed. Burrows poisoned two rabbits with hydrocyanic acid, and suspended them—one by its ears, and the other by its hind legs. After twenty-four hours, he made autopsical examinations. In the one suspended by its ears the external parts of the head, the brain and its membranes were pale and bloodless. In the one suspended by its hind legs the external parts of the head, the brain and its membranes were intensely congested. These, together with many other experiments which might be mentioned, demonstrate conclusively that the quantity of blood within the cranium is variable.

Another consideration deserving of attention here is the importance of an uninterrupted supply of arterial blood to the brain. It must be ever flowing and unceasing in supplying new materials to accomplish needful repairs, for upon this blood supply the cerebral functions are entirely dependent. The molecular changes in the tissues constitute quite a force in carrying on the circulation, for while they are active the blood will continue to flow, though the heart ceases to act; and when they cease the circulation is sluggish, though the heart's action continues. Now if the blood supply to the brain is interrupted either by rapid hæmorrhage or by ligation of the large arteries, there will necessarily result a disturbance of the cerebral functions, manifested by unconsciousness, insensibility and convulsions. These convulsions which occur when the brain is deprived of blood are a necessary consequence of a loss of the control which the brain exercises over the reflex centres of the spinal cord. That the brain does exercise a restraining or inhibitory influence over the reflex centres of the cord is a fact which has a direct bearing upon all convulsive diseases, and particularly epilepsy.

In a decapitated pigeon which flaps its wings, springs and turns summersaults, is seen a familiar instance of loss of cerebral control.

Dr. J. Thompson Dickson has shown, that if immediately after a pigeon has been decapitated, and while all the muscles of the body are violently convulsed, a current from an induction machine is applied to the cord so as to stimulate it, the convulsions will be checked, and when the stimulus is removed they will begin again. That is, convulsions take place when cerebral control is abolished (decapitation); they are checked when cerebral control is restored (stimulation of the battery); and they are resumed when the control is removed.

It has been often demonstrated by experiments upon animals that tying or compressing the arteries which supply the brain produces convulsions. In the horse, the basilar artery is formed by junction of the occipital arteries, and therefore the vertebral arteries have little to do in supplying the brain with blood; hence, by ligation or compression of the carotid arteries in this animal, the brain is deprived of blood. This experiment was performed by Mayer, and the horse died in violent convulsions. It has been repeated by others, and with the same result.

Kussmaul and Tenner produced convulsions in six male adults by compressing the carotid arteries, the convulsions being similar to those of epilepsy. These experimenters killed twenty rabbits by rapid bleeding, and all died in convulsions, in every respect epileptic. They also experimented upon a hundred rabbits, by tying or compressing the arteries that supply the brain. In every case, there were convulsions when the arteries were compressed; the convulsions ceased when the compression was removed, and recommenced when the compression was renewed. Their conclusions are stated in the following language: "It appears, therefore, probable that the convulsions which take place upon closing the great arteries of the neck proceed from the brain, and are produced by its bloodless condition." Other experiments which they performed, seem to prove that the spinal cord is not the starting point for epileptic convulsions. They tied both sub-clavian arteries so that the blood was only conveyed to the brain by the carotids; they then compressed the arch of the aorta by which the cord was completely deprived of blood. Paralysis of the extremities followed, but convulsions did not occur.

They then compressed the carotids, thus depriving the brain of blood, and convulsions immediately followed.

These experiments prove, that a bloodless condition of the cord produces paralysis, but not convulsions, and that a bloodless condition of the brain produces convulsions, even when the extremities are paralyzed from spinal anæmia.

Another of their interesting experiments remains to be noticed. They exposed the sympathetic nerve in the neck of a rabbit, and applied the Faradic current, and convulsions immediately followed; that is, by faradizing the sympathetic, they produced spasm of the cerebral arteries, and the brain being deprived of blood, convulsions ensued from a loss of cerebral control.

In this connection, it should also be remembered, that the sympathetic nerve which supplies the arteries of the brain arises from the medulla, and hence an excitation acting upon the medulla may produce disturbance of the cerebral circulation through the agency of the sympathetic. On this subject, I will quote the elegant language of Dr. Echeverria: "I deem it conclusive, that in this over-action of the reflex centre, and the influence it exerts on the vaso-motor nerves, and in no other condition, is to be discovered the true explanation of epilepsy."

We have then three steps in the production of an epileptic seizure: 1st, irritation acting on the medulla; 2d, contraction of the arteries of the brain; and 3d, cerebral anæmia, followed by convulsions, which result from a loss of cerebral control.

From this somewhat tedious recital of theories and experiments, we draw the following conclusion: That a bloodless condition of the brain, with its sudden arrest of nutrition, is the proximate cause of an epileptic seizure.

In this, we find an explanation of the fact observed in epileptics: the deathly pallor of the face which precedes an epileptic fit. This pallor is simply due to spasm of the blood-vessels of the skin of the face, and is coincident with spasm of the arteries of the brain. Again, in infants, a fright will excite convulsions; that is, the fright which "blanches the cheek" blanches the brain also; i. e., produces contraction of the blood-vessels.

If then cerebral anæmia from arterial spasm is the proximate cause of the epileptic seizure, a remedy is indicated which will prevent contraction of the arteries of the brain, or produce dilatation when they have contracted; and this brings us to the consideration of the nitrite of amyl.

One of the most constant effects of the nitrite is an intense congestion of the skin of the head, face, neck, and upper parts of the body—the degree of congestion diminishing in proportion to the distance of the parts from the brain. It generally increases the frequency of the respirations, greatly accelerates the pulse, and diminishes arterial tension. There is sometimes temporary movement of certain groups of muscles. In the first case given below, there were often involuntary movements of the limbs of one side. The patient was entirely unable to control the action of the muscles, though he repeatedly tried; and he enjoyed with a hearty laugh, seeing his limbs move so lively without an effort of his will. Dr. J. Crichton Browne has demonstrated by ophthalmoscopic examination, that the nitrite produces dilatation of the retinal arteries, and he infers from this, that it causes dilatation of all the vessels within the cranium.

In order to settle, beyond the possibility of a doubt, the action of the nitrite upon the vessels of the brain, the following experiments were performed by Dr. Kempster and myself, in August, 1874. A full grown rabbit was placed under the influence of ether, and a portion of its skull, an inch and a half long by three-fourths of an inch wide, was removed.

There was very slight hæmorrhage, the membranes were plainly visible and uninjured. In one hour from this time, when the animal had fully recovered from the effects of the ether, we administered amyl, and closely watched its effect upon the circulation of the brain. By the aid of a good lens, the vessels of the pia mater were seen to gradually enlarge; vessels which under normal conditions were too small to be seen, were now plainly visible to the unaided eye; the brain seemed to become too large for the cranial cavity, and protruded, black with congestion, through the opening in the skull. The vessels of the ears were at the same time

congested, and to a degree equal in intensity to that observed in the membranes of the brain.*

The effects of the amyl were allowed to pass off; in a few minutes it was again administered, and with the same result.

On December 15th, 1874, we trephined the skull of a rabbit with a one-half inch trephine, and exposed the membranes without injury. Amyl was then administered, and its effect observed with a lens. The result was precisely the same as in the former case: dilatation of the blood-vessels and intense congestion. This completely disappeared when the amyl was discontinued, and when the amyl was repeated, the same result was again observed. Such experiments require no comment; they establish beyond a doubt, that nitrite of amyl produces dilatation of the vessels of the brain. The manner in which it effects this dilatation is an interesting question, and has not yet been satisfactorily determined. Robert Pick† thinks it exercises a direct poisonous effect upon the muscular fibres of the arterial coats, and thus relaxes them.

The weight of evidence seems, however, to favor the opinion that it acts primarily upon the nervous system, and through its agency produces dilatation of the vessels.

The dilatation of the vessels is effected too quickly, and passes off too rapidly to admit of the theory that it poisons directly the muscular fibres of the arterial coats. Again, if this were the case, the superficial congestion would be as marked in the extremities as about the head and face, which is not the fact. It does not cause dilatation of the vessels below the knee, and very slightly those of the forearm.

The following are notes of cases in which the nitrite of amyl has been used in this hospital:

Case No. 1.—Man, aged 53; married; phthisis hereditary; one sister insane. Became epileptic eight years

---

* Since this article was written, I have seen the details of identical experiments performed with the same result by Max Schueller, a German physiologist. I do not know the date of his experiments, though they were performed before mine; I knew nothing of them at the time.

† *Am. Jour. Med. Sciences*, April, 1874.

ago, and one year from that time, evidences of mental impairment were noticeable. A short time previous to a fit, would appear depressed and melancholy. The fits were severe, and he sometimes had several in a day. They were often succeeded by a state of extreme irritability, with paroxysms of violence and fury. At one moment he would be kind, gentle and loving, the next moment harsh, furious, and full of hatred for his wife and child. He threatened homicide; became a petty thief, and a terror to his family and friends.

When admitted to the hospital, was thin in flesh, quiet and feeble-minded. Had on an average three fits of *grand mal* each week, occurring at night. Had a distinct aura starting from neck, and sometimes from left hand.

The administration of the nitrite of amyl was begun on February 28th, 1874, and was continued every other day regularly during the month of March. He had no fits during the month. It was continued during the month of April every other day, and at any time when he felt the aura. In this way a number of fits were prevented, and he passed through the month without having a fit. It was continued during May until the 25th, when he complained of feeling badly, and appeared weak and debilitated. Thinking that from its continued use, the amyl might have some agency in inducing this condition I ordered it stopped for a few days. On the evening of the 28th of May, just three months from the time the amyl had been commenced, he had a severe fit, during the night he had three more, and the next day, and the day following, had three each.

On the second of June, the nitrite of amyl was again given, and it was administered regularly once a day, and as much oftener as he felt an aura.. During the month he had three fits, all at night. July, the nitrite of amyl was given once a day; had two fits. August, amyl given once a day; had two fits. In September and October, he had two fits each month, all at night. Amyl was given once a day, and at any time when he felt an aura, by which a great many fits were warded off.

The following is a record of his pulse:

Average of pulse when not under influence of amyl,		76.
Under influence of amyl,	June,	105.
" " "	July,	106.
" " "	August,	98.
" " "	September,	109.
" " "	October,	100.

Early in November, 1874, he had made such marked improvement in both body and mind, that his wife removed him to his home. The want of the nitrite of amyl and the entire absence of all discipline, soon effected a change for the worse, and he was not long since returned to the hospital as bad as ever.

Case No. 2.—Man, aged 31 years; single; until 23 years of age was stout and healthy, and possessed fair degree of intelligence. When 23 years old, became epileptic, and has remained so ever since. His mind gradually deteriorated, and he is now completely demented. He is one of those listless, dull, and stupid-looking epileptics, who always appear to have just awakened from a profound sleep.

Frequently, just before, or immediately after a fit, he is violent and destructive. At all other times he is quiet and harmless. He does not experience an aura, and the amyl was administered without regard to the possible occurrence of a paroxysm. The congestion of the skin of the face, head and neck, was very marked. One day he fell in a fit, cutting through the integument on the supra-orbital ridge and severing some small blood-vessels; considerable hæmorrhage followed. Compression was applied, and the bleeding ceased. About three hours afterwards, the nitrite of amyl was administered; and when he was fully under the influence of it, the wound began bleeding again, and was only checked when compression was re-applied. The renewal of the hæmorrhage was doubtless due to the action of the amyl, in dilating the blood-vessels which had been severed.

The regular administration of the nitrite of amyl was begun in his case on the 1st of March, and was continued every other day. He had a number of fits during the month, but they were greatly reduced in frequency and severity. On the 8th of April, the nitrite was discontinued, and in a few days he began having fits more frequently. The nitrite was again

administered, and the number of fits was again diminished. The nitrite was given regularly every day from the first of July until the first of November, and though he had occasional seizures, yet they were obviously less severe and less frequent.

This was one of the most unpromising cases that could have been selected. He vegetates and grows fat. Mentally, he is a wreck; his countenance denoting unmistakably, that epilepsy has done its work. All that could be hoped for in such a case has been accomplished—a decrease in the number of convulsions.

Case No. 3.—Man, aged 25; single; painter by occupation. When 19 years of age, had a sun-stroke, followed by an attack of sickness, the nature of which he does not know, except that he had fever and headache. The next summer, had another sun-stroke, and remained unconscious for two or three days. After this he suffered from constant headache, with a sensation of fullness and vertigo. Following this, had an attack of sickness similar to the first attack, only more prolonged and severe, and from that time has never enjoyed good health.

Several months subsequent to this second attack, having changed his occupation and engaged in light in-door employment, he had his first epileptic fit, which was an attack of *grand mal.* About a year from this time, had another fit, and shortly after began having attacks of *petit mal.* These attacks of *petit mal* increased in frequency, with occasional attacks of *grand mal*, accompanied by cramps of the extremities.

He often had twenty fits within the space of a week, and their frequency and severity unfitted him for business. His appetite was poor, he lost flesh, sleep was irregular, his memory became impaired, and he was conscious that his mind was giving way. In June, 1874, began taking the nitrite of amyl. He had a distinct aura, and when this was experienced he inhaled the amyl, and seldom failed in preventing a fit. The success in this case has been quite remarkable. After having taken the amyl for over six months, he wrote the following to Dr. Kempster: "I have only had four fits since I began taking your medicine. My general health is much better; my mind has improved. I can think better, and remember better, and seldom have headache."

Case No. 4.—The notes of the following case have been

kindly furnished me for publication by Dr. T. P. Russell, of Oshkosh.

Man, aged 53; married; farmer. Became epileptic two years ago without any known cause. Has had about ten or twelve fits each year, and all have been attacks of *grand mal* preceded by an aura starting from the hand. He began taking amyl September 1st, 1874, and since then has not had a fit. He carries a small bottle of amyl in his pocket, and on feeling an aura inhales the amyl, and always succeeds in preventing the convulsions.

THE STATUS EPILEPTICUS.

This is a condition in which a series of fits succeed each other so rapidly, that consciousness is not regained in the interval.

The following are cases in which the nitrite of amyl has been used to relieve this condition:

Case No. 5.—Man, aged 45; married. Became epileptic twelve years ago. His mind is greatly impaired; his general health is good. His fits are always severe, and has had *status epilepticus* a number of times. Has never taken nitrite of amyl except on the occasion related below. On September 15th, 1874, he had several fits during the forenoon, and in the afternoon had a number in rapid succession, when the *status* became established. After having remained in this condition for three hours, and having become so exhausted that death seemed imminent, the nitrite of amyl was administered by inhalation. After four or five inhalations, the convulsions *ceased entirely*, and in a few minutes he recovered consciousness, and got up from the floor where he was lying and went to bed. At a subsequent attack, the amyl was administered with precisely the same result.

Case No. 6.—Female, aged 14 years. Has been an epileptic since two years of age, and is an imbecile. On August 24th, 1874, she had several fits, and the *status* became established.

The nitrite of amyl was administered in the following manner: A small paper cone was made, and a piece of cotton placed in it, and *three drachms* of the nitrite of amyl* poured

* Smaller doses were first tried, but had no effect.

upon the cotton. She was then made to inhale it, and after three slight convulsions, they entirely ceased and consciousness gradually returned. In a few hours she was up in the ward.

There are only certain kinds of epilepsy in which nitrite of amyl is admissible. As Dr. Browne remarks: "Epilepsy is a generic term, and it includes many species and varieties." There are certain convulsive diseases mistakenly called epilepsy, in which the nitrite of amyl would be worse than useless. Of course, convulsions due to sudden and intense congestion of the brain, would only be aggravated by the nitrite. It is particularly applicable to that form of epilepsy in which spasm of the cerebral arteries is the proximate cause of the fit, and I believe that much of the future success of the nitrite in this disease, will depend upon the proper differentiation of this from other forms of epilepsy.

Those cases of epilepsy in which there is a distinct aura, are the cases in which the nitrite of amyl promises the most good. Epileptics not in hospital should carry a small bottle of it with them, and when an aura is felt, the amyl should be inhaled, and in this way the convulsions can usually be prevented.

The dose of the nitrite is ten or fifteen drops placed on a piece of cotton and taken by inhalation; it should, however, be increased until the desired effect is obtained.

In conclusion, I wish to urge the importance of determining the physiological action of remedies before applying them to the treatment of disease. It is only by a thorough knowledge of their action that we can escape empiricism. It is hoped that the experiments here recorded will satisfactorily establish the action of the nitrite of amyl upon the cerebral circulation.

It is not claimed that in this disease the nitrite will always cure. Epileptics found in asylums are generally chronic, and it is therefore hardly fair to judge of the value of a remedy by the results obtained in such cases. Epilepsy however, with the mental, moral and physical evils which follow in its wake, is a terrible disease, and a remedy which will even mitigate its severity is worthy of consideration.

Art. III.—THE MOVEMENTS AND INNERVATION OF THE IRIS.

By Dr. H. Gradle,
Resident Surgeon Mercy Hospital, Chicago.

THE manifest dependence of the movements of the iris on a variety of conditions of the system, their easy observation and the importance — physiological and pathological — of their correct practical interpretation, are certainly sufficient reasons for a review of the scattered facts known concerning the mechanism of these complex phenomena. Comparable to the diaphragm of optical instruments, the iris serves the mechanical purpose of excluding from the interior of the eye a surplus of light, admitting the entrance of only the number of luminous rays requisite for the most perfect vision. Beyond this we are not acquainted with any other mechanical function performed by this organ, its supposed effect on accommodation of sight for distances having been disproven by the repeated observation of cases in which the entire iris was absent, and still the accommodative faculty perfect. Facts seem to indicate also, that the iris takes a part in the secretion of the aqueous humor, but this function is foreign to the scope of this paper.

Unlike all artificial diaphragms, however, the iris possesses the power of changing the size of its central aperture, the pupil, under the direction of an automatism so adapted as to render vision most perfect. The extent of these changes amounts to the difference between the diameter of the pupil during its greatest contraction—2 mm. in man—and its maximum dilatation — 7-8 mm.— the average width of the pupil being about 6.2 millimetres (Budge). In children, however, the pupil is *cæteris paribus* larger than in adults, its size diminishing with age. While the movements by which this is accomplished are apparently simple, they occur not only from the direct stimulation by light, but also from a variety of other

conditions, and are therefore quite valuable for diagnostic purposes. We must therefore inquire into these conditions influencing the pupil, and perhaps will best commence with some few anatomical remarks:

The iris consists of a stroma of fibrous tissue, studded with pigment cells, the elastic fibres of which are arranged, according to Merkel, in a circular manner in the anterior plane, in a radiating course posteriorly, thus balancing each other as to their elastic traction. It is therefore impossible that any movements beyond the return to this state of balance could depend on the elasticity of the stroma, unless one set of fibres should become more energetic, by removal of the other or by direct nervous influence, as Gruenhagen is inclined to think. It is true that Brown-Sequard has found the irides of some mollusks to consist only of cellular tissue and still possess contractile properties, exercised under the stimulus of light, but he has not at all demonstrated that the nerves play any part in the production of these movements. Beyond this faint analogy, of which he himself does not even make mention, Gruenhagen has no other proofs in favor of his assumption, which for other reasons appears entirely uncalled for.

The vessels of the iris run in a radiating course from the peripheral to the pupillary border, forming between themselves numerous anastomoses; according to Arnold (*Virchow's Archiv*, Bd. XXVII., s. 345), the arteries are characterized by a remarkable development of their adventitia and muscular tissue, so as to conceal in the normal state the color of the contained blood. From its great vascularity, the iris has sometimes been considered as an erectile organ, but there is neither an anatomical basis nor any physiological proof for this assumption.

Another histological element, however, is found in the iris, the activity of which readily explains its various movements, viz.: the muscular tissue. All anatomists admit the existence of a narrow ring of unstriated muscular fibres (in mammals) surrounding the pupillary border—the sphincter iridis. More as a physiological postulate than from definite anatomical demonstration, a dilator muscle was also described by earlier writers, such as Valentin (*Repertorium*, Bd. II., s. 257),

Budge,* Bruecke (*Anat. d. menschl. Augapfels*, 1847) and Kœlliker. These authors, however, do not agree in their descriptions of it, and especially the last-named anatomist claims to have seen it only in the rabbit, and but indefinitely in the human eye. This muscle was more exactly described in man by Henle in his *Anatomie*. The existence of this doubtful muscle was very strongly denied, at least in mammals, by Gruenhagen,† who claimed to have examined the eyes of different animals with great care, and by many different methods, but could never find any trace of a dilator muscle, the alleged fibres of which, as seen by other writers, he believes to have been connective tissue. Similar statements are made by Rouget (*Journal de la Phys.*, T. III., p. 569). On the other hand, we have lately seen the excellent description of this muscle by Iwanoff and his student Jeropheef, in *Stricker's Handbuch d. Gewebelehre*,‡ the details of which were confirmed by F. Merkel ("Die Musculatur d. menschl. Iris") in reply to subsequent attacks by Gruenhagen in different articles, and also by Dogiel (*Schultze's Archiv*, VI., s. 89). According to these authors, the dilator iridis consists of a continuous muscular layer behind the stroma, of the thickness of two nucleated fibres; the fibres, unstriated, radiating from centre to periphery, straight in the superficial portion, tortuous in the deep layer, are made up of a row of spindle-shaped cells with rod-like or oval nucleus, which is sometimes surrounded by pigment.

The same authorities have also demonstrated a similar though more rudimentary muscle in the iris of birds, which consists entirely of *striated* fibres—a fact that even Gruenhagen is forced to admit, though the latter has not found it in all species.

Even if these demonstrations were doubted—though we do not know for what reason—overwhelming physiological proof must convince us of the existence of a dilator muscle. As will be detailed hereafter, the sphincter muscle is supplied by

---

* *Bewegungen der Iris*, 1855. As this important work could not be obtained, I am forced to rely on quotations from it by other authors.

† *Virchow's Archiv*, Bd. XXX., s. 481, "Ueber Iris-bewegung."

‡ And lately in *Hdbh. d. Ges. Augenheilkunde*, red. von Graefe u. Saemisch.

the motor oculi nerve, while the dilator fibres receive their innervation from the sympathetic; accordingly, section of the former results in dilatation; of the latter, in contraction of the pupil, and stimulation of these nerves brings about the opposite condition. But what is more conclusive, we can carry the effects of the electrical current into the muscles themselves. E. Weber* first noticed the dilatation of the pupil following the application of the poles to the rim of the cornea, which, slow in starting, continued in mammals for a little time (1-2 hours — Brown-Sequard) after their removal, as might be expected from the unstriated nature of the mammalian iris; on placing the poles in the centre of the cornea, a momentary contraction took place. In birds, however, whose striated irides respond much more quickly, contraction was the invariable result, a dilatation by these means being found impossible, which fact does not disagree with the rudimentary development of their dilator muscle.

G. Engelhardt† observed the same phenomena; the dilatation he found, on using needle electrodes, was often only in the direction of the current, thus rendering *the pupil oval.* The contraction he could produce quite readily on applying four needles in a square to the centre of the cornea, the opposite ones being connected with the same pole. The same results have been obtained by Virchow and Koelliker (*Schmidt's Jahrbuecher*, Bd. LXXII., s. 12, 1853) on a decapitated criminal. They also noticed the *oval dilatation of the pupil*, while they could produce contraction by placing one pole on the cornea, the other on some other spot of the head.

Though other explanations than the presence of a dilator muscle have been given for these observations, the fact of an *oval dilatation* alone ought to be enough to establish the correctness of the view here maintained, viz., the presence of antagonistic muscles. An alleged inhibitory influence of the sympathetic nerve on the terminations of the motor oculi is easily overthrown by the capital experiment of Koelliker (*Siebold & Koelliker's Zeitschrift*, Bd. VI., s. 143), who, after

---

* *Wagner's Handwoerterbuch d. Phys.*, Art. *Muskelbewegung.*

† *Beitr. z. Lehre v. d. Beweg. d. Iris. Unters. aus d. Phys. Laborat. z. Wurzburg*, Bd. IV., s. 296.

excision of the sphincter iridis, could still produce further dilatation by stimulating the sympathetic in the neck or by direct galvanization of the iris. The marked dilatation following this removal of the sphincter is the result of the immediate widening of the pupillary aperture by the operation, as well as the traction of both the elastic tissue proper and the elastic dilator muscle, and probably also the *tonus* of the now unopposed fibres of the latter muscle; for the predominance of either muscle in the uninjured iris on section of the nerve of its antagonist, shows plainly that a constant tonic contraction is maintained. Another view of the dilator apparatus which has been taken, especially by Gruenhagen (loc. cit.), is, that the dilatation consequent on stimulation of the sympathetic is due to contraction of the remarkably strong musculature of the vessels of the iris, which are also under the control of the sympathetic, and this is more difficult to combat, though we also possess weighty arguments against it. First, it may be said that the sympathetic still influences the pupil after death or cessation of the circulation, but possibly the remnant of blood still remaining in the vessels might overthrow the validity of this remark. Secondly, Arlt* has shown that the pupillary symptoms set in sooner on stimulation of the sympathetic, and cease earlier, than the changes of vascularity produced by this procedure. Thirdly, we owe to Bernard (*Archives Gen.*, 1862, p. 485) the establishment of the fact that we can divide *separately* the origin of the sympathetic fibres influencing the pupil and the vaso-motor fibres proper, and thus produce oculo-pupillary phenomena without the occurrence of vascular changes. However, as we understand Gruenhagen (loc. cit.), he does not wish to assert any direct dependence of the movements of the iris on the amount of blood contained in its vessels, but claims rather that the contraction itself of the radiating muscular vessels causes a narrowing of the width of the iris. But this view, also, cannot be maintained in the face of the two arguments last cited, while, even theoretically, it would be difficult to explain how the narrowing of calibre of a thick-walled con-

---

* *Archiv f. Ophth.*, Bd. XV., 1, s. 294. "Beitr. z. Kenntniss d. Zeitverhaeltnissen bei d. Beweg. d. Iris.

tractile tube could lead to any considerable shortening of its length.

The opposite state of vascularity, hyperæmia, when but moderate, seems to be of no influence whatever. Thus, Brown-Sequard (*Journal de la Phys.*, T. II., 6, p. 281, et seq.) found no alteration of the pupil on injecting the iris with defibrinated blood, by which means the muscular irritability already lost, could be restored. Nevertheless, he mentions that Rouget, in his injections for microscopical preparations, frequently saw contraction of the pupil ensue, which he refers to the nature of the fluids ordinarily used for this purpose, not enabling them to pass the minute vessels as readily as blood. Perhaps, from a similar mechanical reason, intense congestion of the iris, as in iritis, results in pupillary contraction, which view seems to be confirmed by the clinical observation that the dilatation from atropine will often not take place in this disease before depletion is resorted to. The contraction consequent on paracentesis of the cornea, by which procedure the intra-ocular tension is abolished, may be due to the same cause, viz., intense and rapid congestion, for it is not observed after death; in fact, the absence of any contraction of the pupil on opening the anterior chamber, has been asserted by Liersch to be an absolute sign of death. Conversely, however, the movements of the iris must influence its vascularity, as according to a calculation of Stellwag (*Der Intraoculare Druck*, s. 63–64), were the vascularity unaltered, the narrowing of width which the iris undergoes in a change from maximal contraction to excessive dilatation would be compensated for by an increase in thickness to three times the normal extent, *i. e.*, 0.95 mm., which, inspection shows us is not the case. The blood thus expelled enters the ciliary processes, which now enlarge, and, being truly erectile, contract closer around the periphery of the lens, while the opposite state was observed in them during contraction of the pupil by Becker (quoted by Stellwag, *Der Intraoculare Druck*, s. 62) on albinos. Mackenzie (*London Med. Gaz.*, vol. I., p. 25, 1834) also noticed the same on human cadavers, the contraction of the pupil being accompanied by a receding of the ciliary processes, and *vice versa.*

NERVES OF THE IRIS.

The nerves of the iris are the short, and probably also, the long ciliary nerves (Hyrtl); the latter from the naso-ciliary branch of the first division of the fifth nerve, the former issuing from the ciliary ganglion, as 6–10 small branches, which surround the optic nerve, dividing finally, into 12–18 twigs, before entering the sclerotic. After passing along between the sclerotic and choroid coats, these nerves enter the iris, and are then followed with great difficulty. The best description of them in our possession is that of Arnold;* who, it is true, employed mostly the eyes of rabbits, but asserts that he has seen the same arrangement in man, though he could not demonstrate it as distinctly. According to him, the nerves of the choroid branch dichotomously on entering the iris, and form a net of medium sized twigs with numerous inosculations through peculiar crossing points (*Kreuzungspuncte*), comparable to no other nervous anastomoses, except, perhaps, the chiasm of the optic nerves. Between these inosculations, there were found small bodies, probably nerve-cells.† Finally, they divide into three classes of fibres, viz.: First, pale fibres, probably belonging to the sympathetic, which pass to the posterior surface of the iris, and are apparently distributed to the dilator muscle; Second, medullary filaments running to the anterior surface, and there separating into a dense network of fine fibrils; and Third, a network of fibres in the substance of the sphincter. Receding to the starting-point of these nerves, the ciliary ganglion, we find this little nerve-centre receiving its supply from three sources, viz.: the short, motor root from the third cranial nerve; the long, sensory root from the naso-ciliary twig of first branch of the fifth nerve;‡ and the sympathetic root from the branches of the carotid plexus, accompanying the ophthalmic artery. According to C. Radclyffe Hall (*Edinburg Medical and Surgical Journal*,

* *Virchow's Arch.*, Bd. XXVII. s. 345, et. seq., "Ueber d. Nerven, u. d., Epithel. d. Iris."

† The ganglionic cells in the iris were also found by Meyer, quoted by Budge, *Beweg. d. Iris*, s. 40.

‡ Found absent in dogs by Hensen & Voelkers, *Experimental Untersuch.* etc.; quoted by Stellwag, loc. cit.

1846–48, cited by Carpenter, *Human Physiology*), the branch of the fifth nerve passes through the ganglion without terminating in it; he also describes a root from the sixth nerve in rabbits, but which is not confirmed for that animal, in any work to which we have had access. The development of the ganglion, and with it, its motor root, varies in proportion to the activity of the iris of the species. Fishes, whose irides are said to be immovable (denied by Brown-Sequard), possess no ciliary ganglion (Muck); but also in some animals supposed to possess voluntary control of their iris, do we find the ganglion absent, as for instance, in the barn owl (P. Fario, *Schmidt's Jahrbuecher*, Bd. IV., s. 5).

Now, proceeding to investigate the parts just described, during their activity, the most noticeable phenomenon we meet with is, the contraction of the pupil on exposure to a bright light (even as feeble a light as that of the moon, was found by Brown-Sequard to contract the pupil), so that *cœteris paribus* the aperture in the normal iris varies in size with the brightness of the illumination.*

The retardation or even absence of this contraction under circumstances preventing the light from falling on the retina, for instance, any opacity of the transparent media, seems to indicate that this movement is not due to a direct stimulation of the iris by the light itself. This fact was confirmed long ago by Fontana, by throwing a ray of light on the iris, without allowing it to fall upon the retina, when no appreciable contraction took place; still we are not warranted in denying all influence of the light upon the iris itself. Donders (*Anomalien der Refraction u. Accommodation*) found, that in dogs and frogs (Brown-Sequard also, in man and rabbit), the pupil of the eye which was covered with a black cloth immediately after death, was more dilated than the other exposed eye. The same was even noticed by Brown-Sequard (*Journal d. l. Phys.*, T. II., 6, p. 281, et. seq.) on the eye removed

---

* A rather curious exception to this was discovered by Bernard (*Syst. Nerv.*, T. II., p. 217), in pigeons, whose pupil contracts when a ray of light is directed into the internal angle of the eye, *but dilates* when the light falls on the external angle).

from the orbit; * however, on permitting light to fall through a diaphragm on the retina only and not at all striking the iris, no contraction took place. Again, on exposing merely the anterior half of the globe of the eye, separated entirely from the retina, the movements occurred as readily as if the eye were intact. A direct influence of light on the iris is thus evident; but it remains yet to ascertain, whether the iris musculature itself is stimulated by the light, or affected only through the agency of its nerves.

Harless (*Die Muskelirritabilitaet*) observed a contraction of the human pupil by light, as late as thirty hours after death, when nervous excitability could scarcely be intact. But still further, Brown-Sequard (loc. cit.) noticed the persistence of contractility in the iris of a frog, seven days after death; and in an eel even after the lapse of sixteen days; and at which time, a complete degeneration of the nervous fibres could not be doubted.† In order to ascertain whether this response to light was a property peculiar to the musculature of the iris, Brown-Sequard placed pieces of other muscles of reptiles under the same conditions, which are in the iris so peculiarly favorable to the influence of light, viz.: sufficient thinness to permit transparency, and a limitation behind by a dark pigment layer, absorbing the luminous rays, which same arrangement is also found in the retina. On exposure to strong light, he frequently saw contractions of these pieces, but hardly of such constant occurrence as to enable him to draw definite conclusions. Why the action of the sphincter iridis should predominate under the stimulus of light is not yet settled; an alleged superiority in development and strength over the dilator muscle is quite probable, at least for the

* In the extirpated organ of the frog or eel, these alternate movements of contraction and dilatation could be produced from fifty to one hundred times per hour.

† During life, this reaction of the muscular tissue of the iris does also occur, though it is less noticeable. But for instance, the persistence of slight mobility of the iris on exposure to light which Bernard observed after section of the third nerve, was probably due to this cause. I have now under my observation, a case of double amaurosis, from atrophy of the optic nerve, in which the size of the pupil varies at different hours of the day.

rabbit and frog, for which further proofs will be deduced hereafter.

As to the question which rays of the spectrum affect the iris, the same investigator has also given us an answer. Yellow rays, he found to act like white light; the green and orange ones were of less intensity; while neither of the other luminous, nor the chemical or thermic rays, seemed to be of any influence. We are told, however, by Brown-Sequard (loc. cit.), that considerable changes of temperature will still induce movements of the mammalian iris; a marked dilatation being thus converted into contraction of the pupil, while an already contracted pupil enlarges on sudden change of temperature, whether this be from zero upward or the reverse. But after these movements have been produced for from eighty to one hundred times, we begin to notice that the dilatation becomes less considerable, while the contraction increases in vigor, until finally a permanent state of contraction with immobility of the iris results, as he claims, from the predominance of the sphincter iridis.

Apart from these observations after death, he claims to have seen also a slight pupillary contraction in living animals and man, on exposure to great cold or heat, but does not go into details. Slightly differing from this author, Horvath (*Centralbl. f. d. med. Wissensch.*, 1873, s. 3) has observed a dilatation in rabbits during cooling, while in the frog the opposite state was produced.

Returning again to the phenomena following the impression of the light upon the retina, we perceive at once from the anatomy of the parts, that this is an instance of reflex action, the route of which we will now attempt to trace. On dividing the prolongation of the retina, the optic nerve, the pupil at once dilates, indicating this nerve to be the centripetal channel of a reflex circle in a constant state of tonicity (as long as the stimulus of light is maintained). Irritation of the peripheral end of the divided nerve is of no effect, while stimulation of the central extremity results in a contraction of the corresponding pupil, as Mayo (*Anatomical and Physical Commentaries*, London, 1825) showed conclusively on pigeons. The same was found in mammals (Longet, *Anat. et. Phys. du*

Syst. Nerv., T. II.), who noticed besides an implication of the other pupil by resorting to strong irritation. Following the optic nerve, we find it communicating with the anterior tubercula quadrigemina. Destruction of one of these bodies will lead to dilatation of the pupil, and blindness in the eye of the other side; their stimulation results in contraction; but accurate researches (Budge) have even demonstrated, that only the internal half of each anterior tuberculum possesses an influence over the pupil, destruction of the external half being found without effect. After removal of one tuberculum, and consequent diametrical blindness, light thrown into the eye of the *same* side, will still contract both pupils (Schiff). Destruction of the cerebral hemispheres, the result of which is entire loss of vision, does not interfere with the movements of the iris, since their reflex route is not affected by this procedure. This may account for cases of bilateral amaurosis occasionally observed (Græfe), in which the pupil still responds to light, the lesion being in such cases in the centres for perception of vision, and not implicating the fibres of the optic nerve, passing to the tubercula quadrigemina for reflex purposes; besides, we must also think of the reaction to light of the musculature itself of the iris.*

The return channel of the nervous impulses to the iris we find, by direct experiment, to be the *third* cranial nerve, whose division all experimenters since Mayo have seen followed by pupillary dilatation; and after which procedure, when limited to the nerve of one side, stimulation of the optic nerve of the corresponding side ceases to be of effect on the corresponding eye, though still some contraction may be observed in the other pupil, whose reflex circle is intact (Longet). But while Mayo and Longet saw section of the motor oculi followed by immobility of the iris, which has been frequently observed in man (Romberg) (Arlt, *Ophthalmologie*, Bd. II., s. 112), Bernard (*Systeme Nerveux*, T. II.), found a persistence of slight and slow reaction to light in rabbits. We are at once reminded of the root to the ciliary ganglion by the abducens (sixth) nerve, described by C. Rad-

* In one-sided amaurosis, the pupil still reacts sympathetically with the other eye, as will be detailed hereafter.

clyffe Hall, for rabbits, which was not cut in these experiments, though, as was remarked before, its existence is not mentioned by other writers. In man also, some mobility of the iris will occasionally remain in paralysis of the motor oculi; in one such case, Dr. Grant of New York (mentioned by Longet, *Anat. et Phys. du Systeme Nerveux*, T. II.), found in the autopsy a branch from the abducens (also found occasionally by Sappey) to the ciliary ganglion. The muscular irritability, also, may play a part in this phenomenon. All authors, however, agree that section or paralysis of the third nerve, does not produce maximum dilatation, but that still greater enlargement of the pupil can be effected by stimulation of the cervical sympathetic, the use of atropine, etc.; while a greater contraction is also possible by the use of calabar bean, or by evacuating the aqueous humor (Valentin, *Versuch einer Phys. Path. der Nerven*). Bernard (loc. cit.) cites two cases of paralysis of the third nerve in man, in which there was even no greater dilatation than in the other eye; but in one of them the sight was almost entirely lost in the other eye, whose pupil was certainly dilated, so that no difference could be expected, as the reflex routes for both pupils were intercepted at some point. In the other case, there was only impairment of immobility and no dilatation of the pupil; but we have no assurance that in this person, all the pupillary fibres of the motor oculi were implicated in the paralysis.

Stimulation of the third nerve in the cranial cavity, or of its peripheral end after division of the trunk, was found to contract the pupil of pigeons, by Mayo (loc. cit.); the same phenomena took place in dogs, cats, rabbits, birds, and decapitated criminals, according to Budge and Waller (*Bewegungen der Iris*). If Weber and Volkman obtained pupillary dilatation in this experiment, it was shown by Budge to be due to the longer persistence of irritability after death in a sympathetic branch, in close proximity to the motor oculi, after the irritability of the latter nerve had been lost. This was confirmed on a decapitated criminal by Nuhn (*Zeitsch. f. rat. Med.*, 1853, Bd. III.); Chauveau (*Journ. d. l. Phys.*, T. V., p. 274) also got contraction in rabbits, but not in horses. Strangely enough, however, both Longet and Bernard (loc. cit.) could

never obtain any contraction from irritating the third nerve, the latter using mostly, if not wholly, rabbits. But these negative results, even of such careful investigators, cannot annihilate the facts established by the authorities above cited, and many others besides, as Keuchler ("Inaug. Diss.," Dorpat, 1868, from *Schmidt's Jahrb.*), Engelhardt, (loc. cit.) etc. Cl. Bernard, evidently doubting the direct influence of the motor oculi upon the iris, raises the question whether the dilatation observed after section of the third nerve may not be due to external strabismus thereby produced (as the motor oculi innervates all the ocular recti muscles, except the external one), on the ground of the well-known sympathy between the external rectus muscle and the dilator iridis on the one hand, and between the internal rectus and the sphincter on the other hand? The same view had previously been proposed by J. Mueller and Longet (loc. cit.). The contraction of the sphincter muscle follows the direct stimulation of the third nerve only after some time—*at least* ¼ second (Budge)—partly from the unstriated nature of the muscle, and perhaps also, from a retarding influence of the ciliary ganglion (Donders). This slowness of the pupillary changes is still more noticeable in reflex contractions (and relaxations) on exposure to light.

We have thus found a reflex circle extending from the retina through the optic nerve to the anterior tubercula quadrigemina, from which centres the motor impulse is sent back to the sphincter iridis by the way of the third nerve. The two eyes, however, communicate in this manner: the optic nerves decussate, and thus send the main bulk of their fibres to the tuberculum of the opposite side, while some filaments pass to the reflex centre of the same side; from the tubercula quadrigemina, the motor oculi fibres now proceed to the eye of the opposite side. When light falls on the retina, the pupil contracts in proportion to the intensity of the luminous rays, thus preventing dazzling from over-excitation of—and circles of dispersion upon—the retina; on removal of the light, the pupil dilates again from relaxation of the sphincter.*

---

* Budge refers this enlargement in the dark to a stimulation of the sympathetic by the impulse to see. But how about proofs for this assertion?

On exposing only one eye to the light, the pupil of the other undergoes the same changes, though in a less degree; a fact easily explained by the nervous connection. Hence, in one-sided amaurosis, immobility of the pupil of the affected eye is by no means a constant symptom. Listing * showed that on looking at the sky through a minute hole in an opaque card, the number of rays admitted into the eye, and with them the apparent size of the diaphragm, will vary with the width of the pupil. If now, both eyes being closed, we open one and look through such a diaphragm, a slight contraction of the field of vision is at once noticeable, which is followed by some oscillations, and finally, by a feeble dilatation of the pupil. These phenomena re-occur in the same order, on opening the other eye, an experiment easily performed by anyone. Listing measured the duration of these movements, and found the sympathetic contraction to commence $\frac{2}{5}$ sec. after opening the other eye, lasting $\frac{1}{5}$ sec., and then changing into dilatation. Now, on closing again the other eye, a dilatation begins after the lapse of $\frac{2}{5}$ sec., and lasts two or more seconds. Donders has found in his own case, a longer period of time for each movement, probably from individual peculiarities.

Ordinarily, the iris is not under the control of the will; apparently, the ciliary ganglion intercepts the influence of volition, which is transmitted through the other branches of the motor oculi. However, exceptions to this do occur; thus Fontana is said to have had control of his irides; similarly, Dr. Paxton (*Edinb. Med. Journal*, Jan., 1857, p. 451) claimed to be able to change the size of his pupil by volition; Bruecke also mentions in his *Physiology*, a Dr. S—— possessing the same power. Some animals appear to control their iris voluntarily; for instance, a parrot in our possession changes the size of his pupil frequently, without apparent external cause. We can, however, easily influence our pupil in a less direct way, viz.: by changing the accommodation of the eye. Whenever the eye is directed towards objects close by, the pupil contracts (in order to shut off the peripheral rays of light,

* *Beitr. z. Phys. Optik.*, Goettingen, 1845—cited by Donders, *Anomalien d. Refraction u. Acc.*

which would interfere with distinct vision by producing circles of dispersion upon the retina, on account of greater spherical aberration of the now more convex lens), to dilate again on accommodation for distant points. The reverse is said to take place in dogs (A. Mueller, *Archiv f. Ophthalmologie*, Bd. I., 1, s. 440). E. H. Weber traced this contraction to the sympathy, first pointed out by J. Mueller, between the sphincter iridis and the internal rectus muscle, which latter is called into activity, in the convergence of the optic axes necessary for accommodation for the near point, denying any dependence of the pupillary changes on the action of the ciliary muscle regulating the accommodation. Cramer and Donders (loc. cit.), however, have proven that contraction of the ciliary muscle—i. e., accommodation for near objects—even without any change in the direction of the optic axis, is always accompanied by diminution of the pupillary aperture, and *vice versa;* and that the changes of accommodation precede those of the pupil. By alternately straining and relaxing his accommodation, Donders could change the size of his pupil as often as thirty times per minute.

Accordingly, we find contraction in hypermetropia and absence of the lens—aphakia—where there is a constant effort at accommodation; while in comparative relaxation of this faculty, as in myopia, the opposite state of the pupil is observed. This sympathy between the sphincter iridis and the internal rectus muscles, is undoubtedly a reflex phenomenon, but we do not know the exact route of the sensory transmission. It might, therefore, be worth while to state, that in the case of bilateral amaurosis, previously referred to, I have not been able to detect any pupillary changes on movements of the eye-ball, or attempts at accommodation. In paralysis of the motor oculi, even if only the pupillary fibres are involved, no sympathetic movements of the iris can be produced; * still it seems as if the contraction in accommodation for the near

* As a remarkable exception, Graefe (*Arch. f. Opth.*, Bd. III., 2, s. 363) reports a case of paralysis of the motor oculi, with the usual mydriasis and immobility, in which the pupil was *contracted* by the action of the abducens nerve, pulling the eye outward, to dilate again on relaxation of the external rectus muscle.

point was more powerful than that induced by strong light, as the former may sometimes persist when the latter cannot be produced—in disturbances due to paralysis of the sympathetic nerve (vid. the cases of Arg. Robertson, to be detailed hereafter). The sympathy, also, with another nerve—the facial—has been pointed out by Graefe (*Arch. f. Opth.*, Bd. I., 1, s. 319), who noticed the strong contraction of the pupil on forcibly closing the lids, which exercise he recommends as a remedy in pathological dilatation—mydriasis.

Proceeding next to investigate the other nerves of the iris, the antagonist of the motor oculi—the sympathetic nerve—first arrests our attention. We are told by Bernard (loc. cit.), that Pourfour du Petit* was the first who noticed on division of the cervical sympathetic, the group of symptoms generally known as oculo-pupillary phenomena, and amongst them contraction of the pupil. Hereupon, Dupuy, (*Journal de Medicine et de Chirurgie*, etc., T. XXXVII., p. 340, 1816) showed that the same consequences resulted on extirpation of the superior cervical ganglion, which was confirmed by Brachet (*Syst. Nerveux Ganglionaire*, 1837), and Reid (*Edinb. Med. and Surg. Journ.*, Aug., 1839, and *Phys. and Path. Researches*, Edinburg, 1841).

In 1846 Biffi established more definitely the influence of the cervical sympathetic upon the iris by galvanizing it, with the effect of producing dilatation of the pupil; but as we do not intend to give a historical sketch, we will limit ourselves to mentioning merely these claims of priority. Examining more closely the oculo-pupillary phenomena after section of the sympathetic, we find them to consist in contraction of the pupil, vascular injection of the conjunctiva and iris (Bernard), recession of the eyeball, flattening of the cornea, protrusion of the third lid (in animals), and partial closure of the lids with elliptical distortion of the interpalpebral space. The very opposite results follow the stimulation of the nerve. The contraction on paralysis of the nerve is not accompanied by immobility of the pupil, as light still contracts, and its removal

* *Memoire dans lequel il est demontre, que les nerfs intercostaux fournissent des rameau, qui se portent des esprits sur les yeux, in Histoire de l'Academie Royale des Sciences.* Annee, 1727.

dilates it. Section of the motor oculi enlarges the pupil, which is still more increased in size by stimulation of the superior end of the divided cervical sympathetic. Simultaneous stimulation, however, of both the motor oculi and the sympathetic shows the predominance of the former nerve—the pupil *contracts* (Engelhardt). The difference in the pupils on unilateral division of the sympathetic is most marked on shading the eyes. While this paralytic contraction is considerable in the dog, it is said to be wanting in birds (Budge), and very slight in frogs and rabbits, in which latter animals the pupil frequently becomes of an oval shape; in cats Remak* has found, that the pupil, which, when contracted, is slit-shaped in this animal, will not assume this shape on exposure to strong light after division of the sympathetic. In man there have been many cases of paralysis of the cervical sympathetic, with results similar to those of experiments. Willebrandt (*Arch. f. Ophth.* Bd. I., s. 319) found in a case of strong contraction the cause of the myosis in a chain of swollen cervical glands pressing on the sympathetic, the correctness of which diagnosis was confirmed by the return to the normal state on the local use of iodide of potassium. Gairdner (quoted by Eulenburg and Guttman, *Path d. Symp.*) saw contraction of the pupil from the embarrassment of the sympathetic by an aneurism of the aorta and innominate artery. In a similar case, due to aneurism of the left carotid artery, Coates (also quoted by Eulenburg, l. c.) restored the normal size of the pupil by ligation of that vessel. Heinecke (Eulenburg, l. c.) observed myosis from cervical carcinoma, in which case but little dilatation could be produced by the use of atropine. A case is reported by Weir Mitchell, Morehouse and Keen, in which a gunshot wound, apparently severing the cervical sympathetic, was followed by great contraction and other symptoms of paralysis of the nerve. Kaempf (*Sitzungb. der K.K. Ges. d. Aerzte*, 1873, Wien,) communicates a similar case. Ogle (*Med. Chir. Transact.*, T. XLI., p. 394) cites a case of Dr. Kidd's, of cervical phlegmasia, the suppuration of which was ushered in by rigors, violent pain, and considerable mydriasis, which disappeared after sleep. On the next

* *Galvano-therapie d. Nerven u. Muskeln*, p. 51, quoted by Valentin, *Versuch einer Phys. Path. d. Nerven.*

evening rigors again occurred, but this time with contraction of the pupil, changing to dilatation when the pain recommenced. After opening the abscess the symptoms vanished, but recurred in two subsequent attacks of the trouble. We have evidently to deal here with an irritated state of the sympathetic from the contiguous inflammation, followed by partial paralysis, perhaps from pressure, while the dilatation on the re-appearance of pain may have been due to a powerful stimulation of the nerve, which, as we shall see hereafter, always occurs on strong sensory impressions. The same author mentions another case of stimulation of the sympathetic, resulting in mydriasis from aneurism of the aorta and cervical carcinomatous infiltration.* Dilatation of the pupil was also observed by Du Bois Reymond,† in his own case of hemicrania; in other cases of that disease described by Eulenburg and Guttman (loc. cit.), contraction followed at the close of the attack. Moellendorf,‡ however, found in the variety denominated by him "Hemicrania sympathetico-paralytica," a contraction with other symptoms of sympathetic paralysis, and the same was confirmed by Berger (loc. cit.).

Experimental stimulation of the sympathetic has also been attempted in man by Eulenburg and Schmidt,§ who found a very slight dilatation (not constant) on the opening of a current of 20–40 cells, passing upwards through the neck. Distinct dilatation, however, was produced by R. Wagner (*Journal d. l. Phys.*, T. III., p. 175), by iritation of the sympathetic in the head of a decapitated criminal, the want of success in the other case being attributable to the diffusion of currents and the greater strength of current required by the sympathetic for its stimulation. The dilatation of the pupil from irritation of the cervical sympathetic is not at once established. Budge (*Phys.*, p. 656) found the pupil to enlarge from 4 mm. to a diam-

* A case of abscess involving the cervical sympathetic, with pupillary contraction, is given by Prof. Jewell in this journal, 1874, p. 15.

† "Zur Kenntniss d. Hemicranie," *Arch. f. Anat. and Phys.*, 1860, p. 461–468.

‡ Vid. O. Berger. "Pathogenese d. Hemicranie," *Virchow's Arch.* LIX., III., and V., s. 315, transl. in this journal July, 1874.

§ "Unters. ueber d. Einfl. bestimmter Galvanisationsweisen auf d. Pupille," etc. *Med. Centralblatt*, 1868, Nos. 21 and 22.

eter of 5 mm., on including the nerve in a current for one-half second, a diameter of 7 mm. being reached after three seconds' galvanization, after which average time further stimulation did not prevent a gradual recession of the enlargement, which, on cessation of the current, returned to the normal standard in about twelve seconds. Still the pupillary changes precede and cease sooner than the vaso-motor phenomena (Arlt, *Arch. f. Ophth.*, XV., 1, s. 294 et seq.), a fact clearly showing their mutual independence. The influence, however, of the sympathetic upon the vessels of the iris is a matter of daily observation, as shown by the hyperæmia of the iris on its section, and again the paleness of the same on its irritation. This contraction of the vessels took place in the experiments of Donders (loc. cit.) with DeKuyper, even after dilatation by the local use of digitalis, or contraction by paracentesis corneæ or calabar bean, which latter prevented the production of a pupillary dilatation.

The dilator fibres have been further traced to the superior cervical ganglion, the influence of which over the pupil is more marked than that of the cervical sympathetic nerve, especially in the rabbit. In this animal, however, the slight difference in the two pupils, caused even by extirpation of this ganglion, diminishes considerably in the course of a few weeks. This ganglion is claimed by Budge to contain all the dilator fibres, since the fatty degeneration of these nerves, following their separation from their centre after some weeks, by destruction of the ganglion, prevents all further dilatation of the pupil in rabbits, even on applying the poles to the cornea, when, if the motor oculi is intact, contraction always takes place. For the dog, however, Vulpian (abstracted in *Revue des Sciences Med.*, 1873, and this journal, July, 1874) obtained different results, there being also other channels for the dilator fibres in these animals. Stimulation of the inferior cervical and also the superior thoracic ganglion was found of influence on the pupil by Budge, but below this he could not obtain any results from excitation or section of the sympathetic. But in connection with Waller (*Comptes rendus*, 1852, XXXIV. and XXXV.) the same physiologist, Budge, traced the dilator fibres into the spinal cord, which *they leave with the anterior roots of the*

seventh and eighth cervical and the first and second dorsal nerves, passing through the rami communicantes into the sympathetic (in rabbits). Stimulation of the anterior or the *central* end of the divided posterior roots of these nerves resulted in dilatation, *but not after division of the sympathetic*, while section of the anterior roots, or unilateral or complete destruction of the cord was followed by accordingly one-sided or double contraction. This limited region of the cord, termed by Budge *centrum cilio-spinale inferior*, is claimed by him to be the seat of origin of the pupillary nerves, as no other spinal roots were found of any influence. But he maintains also the existence of a centrum cilio-spinale superior (Budge, *Phys.*, s. 669), the close relation of which to the origin of the fifth nerve, which is also of influence on the pupil, prevents its experimental galvanization. From this a filament, found by Luschka also in man, passes into the trunk of the hypoglossal nerve, finally leaving this to enter the superior cervical ganglion. Section of all branches of the ganglion, except the one last mentioned, is not followed by complete degeneration and loss of irritability of the dilator fibres, but division of this branch also soon leads to an entire loss of irritability. In only one case did Budge succeed in demonstrating directly the dilatation on galvanizing this filament. Section of the hypoglossal nerve itself causes in frogs pupillary enlargement, probably from an irritative state thus induced in this filament; this is soon followed by the final paralytic contraction. The inferior cilio-spinal region was found by Chauveau (*Journ. d. l. Phys.*, T. IV., p. 370) to be merely a reflex centre, and not the point of origin of the pupillary nerves, as irritation of either the anterior or the lateral columns of the cord was entirely without effect, though excitation of the posterior columns or of the posterior roots induced reflex pupillary changes.

Examining the cilio-spinal region, or, as he terms it, the "centre oculo-pupillaire," in dogs, Bernard (*Journ. d. l. Phys.*, T. V., p. 383, et seq.) arrived at the interesting result that in these animals he could produce separately vaso-motor phenomena, without the pupillary symptoms, by cutting *subcutaneously* the sympathetic between the second and fourth ribs, while the oculo-pupillary changes were isolated by manipu-

lating the anterior roots of the first and second dorsal nerves only. According to him, division of these two roots, and sometimes by necessity also of the third dorsal nerve, removes the pupil entirely from the influence of the cord. In the same article the ingenious experimenter also points out—for the first time to our knowledge—the great sensitiveness of the iris to impressions on sensory nerves, any irritation of nerve trunks on their terminations being indicated at once by a more or less considerable dilatation of the pupil, which, however, did not occur after section of the anterior roots mentioned, thus showing the cause of this enlargement of the pupil in an excitation of the dilator fibres.* The question whether the pupillary fibres originate in the limited cilio-spinal region was most positively (as he thought) answered by Budge in the affirmative, on the ground that after isolation of this centre by two sections at the height of the exit of the roots of the sixth cervical and the third dorsal nerve, stimulation of the posterior roots still produces dilatation; the dilatation found by others, on galvanizing the cord beyond these limits, he refers to diffusion of currents. But while the latter is a mere assertion, the former proves nothing, except that *at least some of the dilator fibres connect with cells in the region described.* While it is true, dilatation following excitation of any sensory part of the cord could be explained as merely the reaction of the pupil to a sensory impression, the results of section can certainly not be misconstrued. Thus, division of the cord, as low as the ninth—sometimes even the tenth—dorsal vertebræ was observed by Brown-Sequard (*Phys. and Path. of the Nervous Centres*, p. 144) to result in contraction of the pupil, unilateral or bilateral according to the extent of the section. Upward, Schiff has followed the dilator fibres into the cervical portion of the cord, and Salkowsky (*Meissner's Jahresbericht*, 1867—quoted mainly by Stellwag, *Der Intraoc. Druck*) has found their origin probably in the medulla, in close relation to the vaso-motor centres. Section of the cord as high as between the atlas and occipital bone, *prevents* the dilatation observed regularly in

* The fact that Chauveau saw no dilatation, on irritating the anterior and lateral columns, need not be doubted, for this shows merely that they are devoid of sensation.

curarized animals on cessation of the artificial respiration (Salkowsky, (loc. cit.) Ragow, Stellwag (loc. cit.). Hence this would show that many, if not all, of the fibres pass from the medulla through the cilio-spinal region into the sympathetic.

The discovery of Bernard, of the great sensibility of the iris to sensory impressions, has lately been reviewed in various articles. Vulpian (Article "Moelle epiniere," *Dictionnaire Encyclop. des Sciences Med.*) called attention to the fact that in curare poisoning this sensitiveness is, if anything, rather heightened, at any rate more noticeable, and mentions that he uses the iris as an index of the sensibility. Budin and Coyne* go into details about the value of the iris in ether and chloroform narcosis; but perhaps the subject is dealt with most minutely by Schiff and Pio de Foa.† According to them, the pupil is a more delicate index of sensibility than even the blood-pressure, and does not lose this property by anything short of the state of complete narcosis, it being not at all diminished by curare and by anæsthetics, except after all sensibility is destroyed. The delicacy of this æsthesiometer, so to speak, is so great that even mere tactile impressions are at once indicated by pupillary dilatation; this I have myself often verified during the progress of etherization. If, however, the cord was severed between the skull and the atlas, no further pupillary changes could be produced by irritation of parts below the section, which Schiff thinks is sufficient proof that the dilatation is a sign of *cerebral* perceptions.

We thus find the iris connected with another reflex arch, starting, probably, in any peripheral nerve, and having the medulla for its centre, whence fibres proceed to the cilio-spinal region, and perhaps joined by fibres arising from other parts of the cord, pass through the anterior roots of this region into the cervical sympathetic, and through the superior cervical ganglion upward. While by this channel any peripheral impression is at once manifested as pupillary dilatation,

---

* *Le Progres Med.*, Sept. 5, 1874, and in several notes read to the Societe de Biologie.

† *L'Imparziale*, Oct. 17, Nov. 2–17, 1874, translated by Coyne in *Gazette Med. de Paris*, Feb. 13, 1875, "Sur la pupille comme esthesiometre."

the purpose of such an arrangement is as yet a matter of speculation.

The experiments on the spinal cord of animals find their analogy in pathological cases in man. Rendu* has found statements in regard to the state of the pupil in but sixteen out of one hundred cases of spinal injuries. Amongst them he cites two observed by Desormeaux, one of them being a luxation of the sixth cervical vertebra, with softening of the cord, and bilateral contraction; the other, a case of hæmorrhagic softening about the seventh cervical vertebra, with dilatation on one and slight contraction of the other side. Eulenburg† reports a case of Potts' disease of the lower cervical and the three upper dorsal vertebræ in a boy of eight years, in whom the right pupil was constantly wider than the left one and more sluggish in its movement. After two months' treatment, both pupils had become equal, though the right was still sluggish. Another case of irritative enlargement of the pupil is related by M. Rosenthal (*Oester. Zeitsch. f. pract. Heilk.*, 1866, No. 46) occurring in a laborer after a stab in the neck about the heighth of the sixth cervical vertebra. Paresis of the right upper and lower extremity, dilatation of the pupils, especially the left one, and retardation of the pulse to 48 beats per minute, were the symptoms observed for four weeks until the final cure. Evidently the cord was not severed in this case. On the other hand we are informed by Brown-Sequard (*Lecons sur les nerfs vaso-moteurs*, p. 210, note) of three cases of contraction of the pupil from injury to the spinal cord about the lower part of the neck. Four cases of myosis of spinal origin are reported also by Robertson (*Edinburg Med. Jour.*, Dec., 1869), in which sensibility to light was not apparent, though the contraction was increased by *attempts at accommodation* and the action of calabar bean.

Following the sympathetic upward, dissection reveals the carotid plexus to be the route of transmission to the eye, stimulation of which does indeed dilate the pupil even in man (*Schmidt's*

* "Des Troubles Fonctionelles du Grand Sympath. observes dans les Plaies de la Moelle cervicale." *Arch. Gen. de Med.*, Sept., 1869, p. 286–297.

* *Greifswald med. Beitrage*, 1864, III. s 81 83. Abstracted in Eulenburg and Guttman's *Path d. Symp.*

Jahrb., Bd. 85, s. 11). From this, fibres surround the ophthalmic artery and finally enter the ciliary ganglion as its sympathetic root. It is, however, questionable how many, if any, of the dilator fibres are contained in this root, as we have positive evidence that the bulk of the pupillary filaments follow another course. The motor oculi shows a gangliform appearance, where it passes along the outer wall of the cavernous sinus (Bernard) and receives at this place fibres from the carotid plexus, the functions of which are not yet known. More fibres, however, join the fifth nerve at the Gasserian ganglion and its ophthalmic division along the cavernous sinus. In a very ingenious way the sympathetic fibres have been followed by Coloman Balogh (*Moleschott's Unters.*, VIII. s. 423. Abstracted in *Schmidt*, Bd. 116, s. 62), who used as an excitor *asphyxia*, which results in a dilatation following a primary contraction, experimenting on dogs, as appears from the phenomena, though this is not mentioned in the abstract. The dilatation, he found, was diminished considerably by extirpation of the superior cervical ganglion, and altogether prevented by destruction of the Gasserian ganglion, direct irritation of which, or of the ophthalmic branch of the fifth nerve, correspondingly produced pupillary enlargement. In rabbits, Donders (loc. cit.) obtained but a very slight dilatation on stimulation of the cervical sympathetic after division of the fifth nerve, and in four cases out of eleven, none at all. Hence most, if not all, dilator fibres pass in the course of the trigeminus. The vaso-motor fibres, also, of the iris join the fifth nerve *on its inner side.* Schiff (*Unters. z. Phys. des Nervensystems*) first maintained that the trigeminus was the ocular vaso-motor nerve, but this was more thoroughly investigated by Wegner (*Arch. f. Ophth.*, B. 12, 2. "Experim. Studien ueber Glaucom"). This experimenter found hyperæmia of the iris on section of the sympathetic, which was not increased by division of the fifth nerve, after which latter procedure, stimulation of the sympathetic, otherwise producing anæmia of the iris, was of no effect. The conclusions from this are evident.

As we have seen that the trunk of the trigeminus contains pupillary fibres, let us now investigate this nerve more closely. Being the only sensory nerve in the orbit, exclusion

points to it as the sensitive centripetal route for impressions made on the iris, to which the latter is exceedingly sensitive; after its paralysis, anæsthesia of the iris is always observed (Donders). The effects of irritation of its peripheral termination, as when this is applied to the cornea or conjunctiva, are pupillary contraction; this is not even prevented by a paralysis of the motor oculi induced by atropine, as we see often in intense keratitis; or as can be proven by the application of strong irritants to an animal's cornea (Ragow; Stellwag, loc. cit). Either, therefore, the strong excitation overcomes the paralysis of the motor oculi caused by atropine, which is an unfounded assumption, or more likely, a reflex inhibition of sympathetic influence is the cause, analogous to the process of the consecutive congestion of the parts irritated.

The direct influence of the fifth nerve upon the pupil differs so much in different animals, that we must study it separately in each species. In the dog, the dilator fibres of the sympathetic pass to the eye in the trunk of the fifth nerve; hence stimulation of the same from the Gasserian ganglion onward, results in dilatation in this animal. But several weeks after extirpation of the superior cervical ganglion and consequent degeneration of these nerves, Budge found no more effect on irritating the fifth nerve. However, as we have noted before, Budge's statement, that all dilator fibres pass through the superior cervical ganglion, has been disproven for the dog by the more recent researches of Vulpian; hence we can put more faith in the different results of Balogh's (loc. cit.) experiments. This writer saw distinct dilatation on exciting the trigeminus before it enters the Gasserian ganglion; the same was also observed on stimulation of the medulla oblongata, *but not after section of the fifth nerve.*

We, therefore, find also in the dog, a "centrum cilio-spinale superior," as in the rabbit and frog, and about in the same location, though its efferent nerves pursue a different course in this species. A possible inference, however, that the influence of the trigeminus depends on its anastomosis with the sympathetic, is at once overthrown by the results of section of the former, which in the dog and cat, are always pupillary enlarge-

ment, the same as on its stimulation; but whether this is permanent, I have not been able to ascertain. The cause of this phenomenon, whatever it be, is certainly a very effectual one, as the dilatation by the use of atropine is always greatest in the eye whose trigeminus has been severed (Donders).

In the rabbit and frog, an entirely different order of phenomena is observed. Section of the nerve in these animals, produces at once a considerable contraction and immobility of the pupil, which diminishes after half an hour, to disappear almost entirely after some days. In one case, Bernard (*Syst. Nerv.*, T. II., p. 75–76) saw it followed by dilatation; but a hæmorrhage which occurred, seems to have affected the motor oculi so as to render the results imperfect. But Donders also claims that dilatation follows if the eye is protected; if the latter precaution be not taken, a slight contraction will remain permanently (from reflex irritation starting in the drying, and other changes of nutrition in the cornea, after section of the trigeminus, the ciliary ganglion acting as reflex centre. This is the only way in which we can view it, and it is certainly complex enough). According to Budge, the contraction is only permanent, if the division is made peripheral to the Gasserian ganglion, so as to implicate the anastomotic fibres from the sympathetic. But it is not to be assumed, that the contraction is due merely to section of the dilator fibres, for the diminution in the eye of the pupil is much greater than after extirpation of the superior cervical ganglion or division of the sympathetic. What is more, the pupil, contracted and oval after destruction of the superior cervical ganglion, becomes *rounded and much smaller* on section of the ophthalmic branch of the fifth nerve, to resume its former shape after some days (Bernard, loc. cit. p. 73).

If, therefore, apart from the division of the dilator fibres another influence is exerted on the iris, through what channel does this pass? Paralysis of the motor oculi terminations by atropine does not prevent the contraction, nor does section of the same, or in fact destruction of all ocular motor nerves (Bernard, loc. cit., p. 204–8). But after the use of atropine, the intense contraction does not remain as long as without it (Graefe, *Arch. f. Opth.*, Bd. I, s. 309); though according to

Donders, the pupil corresponding to the severed trigeminus does not dilate as much (in the rabbit) as in the normal eye.

A direct influence of the trigeminus on the iris is therefore undeniable; besides its effects have even been studied and found the same by Schiff, on division of the nerve at its origin in the medulla. This author considers the effects due to the division of the filaments of the fifth nerve proper, as irritative phenomena, due to an evanescent excitation of the nerve by the procedure, and this view seems to us the most reasonable, from the facts now to be mentioned.

The same results as after section, Budge produced by mere compression of the nerve (without impairing the mobility), and, what at first seems paradoxical, they are the same on stimulation either mechanical (Bernard) or galvanic (Budge). While I am not acquainted with any actual experiments as to whether excitation of the peripheral or distal end of the divided nerve is the necessary condition, reflex action can safely be excluded in this result, as the same is observed after division of all motor nerves of the eye. Nor can an exalted sensibility of the retina, thus produced, account for the contraction, as this takes place after—and entirely overcoming—the dilatation following section of the optic nerve, according to Bernard. Yet the same author makes a statement (loc. cit., p. 225), which would tend to make the matter even more obscure, were it not rendered extremely doubtful by the experiments of others; it refers to the contraction on pinching the ophthalmic division of the fifth nerve, which he could not produce *by experimenting upon the same at a place before it receives its anastomoses from the sympathetic along the cavernous sinus.* On the other hand, Samuel (*Die Trophischen Nerven*) found a marked contraction remaining for some time by galvanizing the Gasserian ganglion, but when the current was very intense, *dilatation* was produced. The effects of irritating the trigeminus are very slow, when compared with the contraction on excitation of the motor oculi (Budge).

Ragow* comes to the conclusion that section of the trigeminus operates by reducing the *tonus* and the elasticity of the

---

* *Henle & Pfeifer's Zeitschr. f. rat. Med.*, 3te Reihe XXIX., p. 167, abstracted in *Schmidt's Jahrb.*, Bd. 136, s. 77.

iris, but, as I was unable to obtain the original, and find no experimental record in the abstract, I do not know what value to attach to this conclusion in such a vague expression, nor am I aware of any other facts warranting such a theory. There is also positive evidence (in the destruction of the motor nerves) to exclude reflex influence through the fifth nerve. A direct connection with the iris musculature does not seem probable from any known facts, and is rendered more unlikely by the almost immediate loss of irritability of the nerve after death (Budge, Gruenhagen), and by the slow reaction of the pupil to impulses from the fifth nerve. These latter facts, however, would agree very well with an assumed connection of the nerve with the *ganglionic cells* in the iris. While, from want of experimental proof, a new hypothesis on our part would be most objectionable, a mere critical analysis of the facts appears certainly more pardonable:

There can be but little doubt, that section of a nerve induces in the same an evanescent state of excitation (vid. article by Goltz and Freusberg on "Dilating Vaso-Motor Nerves," translated from *Pflueger's Arch. f. Phys.*, IX., s. 475, for this journal, Oct., 1874); such slight excitation, however, is only indicated by organs as sensitive as nerve-cells. Now, on ascribing to the cells in the iris a control over the musculature, which no known fact contradicts, the excitation produced in the fifth nerve by its operative interference, would be manifested by muscular activity, were the nerve connected with the cells, which is therefore the only subject of hypothesis. That the action of the sphincter should predominate in the rabbit may be due to better development of the same, as both the slight effects on section of the sympathetic and the final pupillary contraction found by Brown-Sequard on continued exposure to changes of temperature would indicate; besides, we do not know whether the ganglia in the iris influence both of its muscles equally. The temporary pupillary contraction on division (resulting in irritation) of the nerve is obtained isolated by operating on the trigeminus before it contracts anastomoses from the sympathetic; the results of the operation beyond this point are complicated by the simultaneous section of the sympathetic filaments, whence a less contraction remains perma-

nently. On stimulating the nerve by direct excitation, we have the same results, the dilatation proper to an irritated state of the sympathetic filaments being masked by the more powerful influence of the trigeminus; but if the latter is exhausted by too strong an irritation, as in the experiment of Samuel, the effects of the less easily exhausted sympathetic become apparent. For the dog a similar explanation would answer equally well, merely substituting for the muscle upon which the influence of the fifth nerve is most powerfully exerted, the dilator iridis. But we suggest this explanation merely as a possibility, until facts can be adduced to disprove it. In pigeons, neither section nor excitation of the trigeminus was found of any effect on the pupil by Mayo (loc. cit.) or Bernard.

Stimulation of the periphery of the trigeminus in man, as it occurs in inflammatory diseases of the eye, is always accompanied by contraction of the pupil; but the irritation of the nerve in neuralgia, where the trunk is mostly involved, results generally in pupillary dilatation, for instance, in the cases recorded by Notta (*Arch. Gen. de Med.*, 1854) and Hutchinson (*Ophth. Hosp. Rep.*, vol. IV., 1, p. 120 et seq.). In paralysis of the fifth nerve, we find very few statements of any value on the pupil, the latter being often not at all observed, perhaps from cloudiness of the cornea—the first step in the destructive changes of nutrition resulting from such an accident. Immobility of the pupil is mostly noticed, perhaps often due to the concomitant impairment of sight or to adhesions—the result of a *neuro-paralytic* iritis.

In the older cases of Mayo, Serres, Abercrombie, Stanley and Berard collected by Longet, contraction is prominent, while in some cases cited by Samuel dilatation was observed. Graefe (*Arch. f. Ophth.*, Bd. III., 2, s. 25) reports a case of paralysis of the third, fourth, fifth and sixth nerves, in which dilatation and immobility of the iris were the symptoms, and in which, after an implication of the third and fourth nerves of the other side, the corresponding pupil became *actively* dilated. On the other hand, Stellwag mentions a case of bilateral paralysis of the third and fifth nerves, in which marked contraction and immobility existed on both sides, the

pupil being by far the smaller on the side corresponding to the most complete paralysis of the trigeminus.

These scattered facts are certainly not calculated to throw light on the obscure relations of the fifth nerve in man, though perhaps the weight of evidence is in favor of a contraction in paralysis of the same.

(*To be Continued.*)

Art. IV.—ANGINA PECTORIS; A FIRST ATTACK FATAL IN TWENTY HOURS.

Reported by J. H. Hollister, Prof. of Gen. Pathology in the Chicago Medical College, etc.

CONCISE and accurate statements of individual cases of this disease are perhaps the best service that can be rendered, until, with reference to its pathology, reliable and perhaps valuable generalizations may at last be made.

There are some points in connection with the following case, which I think may be of value to the profession, while I deeply regret that owing to the pressure of engagements I was not able, by post-mortem examination, to give a more perfect report.

Mrs. H. American; aged 70 years; 5 feet 4 inches in height, weighing usually about 100 lbs., with little color and of slight and rather frail appearance; had been a sufferer from neuralgia, usually from tic-douloureux, during the greater portion of her middle and later life. She was at times troubled with catarrhal inflammations of the respiratory mucous membranes, and about seven years before her death suffered severely from pneumonia.

It should be said of her that she did not menstruate till she was *twenty years old*, and that the periods ceased without any untoward symptoms when she was *thirty-six.*

During this period she was the mother of five children, who, like herself, were persons of great mental activity and of considerable physical endurance, but, like her, of slender form. She had some degree of discomfort at times, and attributed it to her pulmonary attacks, but was never suspected of having organic disease of the heart till the time of her death.

I was called to see her February 9, 1875, at 7 o'clock A. M. A day previous she had complained of uneasiness and slight discomfort in the chest, but had been as active as usual. The paroxysm was almost instantaneous, and occurred an hour previous to my arrival. The agony she suffered was beyond endurance, and was referred directly to the heart. The heart action was rather feeble than otherwise, the pulse small, easily compressible, and about 120 per minute. I do not think there was any perceptible hypertrophy or dilatation of the heart, but there was, very markedly, valvular incompetence of the systemic aortic semilunar valves, with distinct regurgitation. There was care on the part of the patient to breathe rather gently, and to move with care, as sudden muscular activity seemed to increase the pain. There was at times a slight remission of the intense severity of pain, but never for a moment any distinct intermission, till in twenty hours from the onset of the attack it proved fatal.

Treatment.—At my first visit I ordered to be given at once tinct. opii. deodorata, gtt. xx. with direction to repeat gtt. x. every hour till relieved. Sinapisms and hot fomentations to the chest, and warmth to the extremities. At 2 o'clock P. M. saw her a second time; she had taken in all of the tincture of opium gtt. xc., without any mitigation of pain. Ordered sulph. morphia gr. $\frac{1}{3}$, same amount to be repeated every two hours and continue the tincture of opium twenty drops in the hour intervening, watching carefully for the appearances of narcotis. Mind clear; respirations free and no appearance of pulmonary congestions; respirations about 20 and nearly natural; pulse 130 per minute and rather feeble. The bowels had acted in the morning and the urinary secretions seemed natural. She rose from bed and changed her positions with celerity, and with fully her usual strength. The voice was strong, and I could discover none of the usual symptoms of

inflammatory action. The agony of suffering, which she uniformly referred to the precordial region, the left shoulder and left arm, was beyond any power of expression.

Saw her again at 6 o'clock P. M. Pain still as intense; other symptoms about as before. Ordered full doses of the Collin Brown preparation of chlorodine and morphia, to be continued as before; slight contraction of pupils, but otherwise no appreciable effects of opium. At 8 o'clock she was partially chloroformized, and with some seeming momentary relief. The force or character of the heart action was not sensibly altered by its action. With slight intervals the use of chloroform was resorted to, but not to the extent of depriving her at any time of consciousness. It seemed palliative but in no sense curative. Respirations were not materially disturbed, perhaps a little accelerated. She changed her positions often and without assistance, and rose from her bed but a few moments before death, and up to the last moment had command to the full of her mental faculties. Thus her suffering continued till 2 o'clock and 45 minutes on the following morning, when, as with a sudden gripe or spasm, the conflict ended and the heart was still.

A few words in conclusion:

1. By far the greater number who suffer from this disease are males; *this* was a lady.

2. Dr. J. T. Johnson, in his interesting article upon the angina of Charles Sumner, raises the question whether the use of *tea* may not induce the disease. In this case the patient had made no use of tea for *forty* years.

3. There was the organic disease of the heart so frequently referred to by writers, and which is the subject of special remark by Prof. Flint.

4. The patient had been a life-time sufferer from various forms of neurotic disease. I can form no other conclusion but that this was but another manifestation, and it was fatal in twenty hours from its first attack. Question:—Is this disease hereditary? and is the heart complication of that nature?

The father of this lady died suddenly of "heart disease" at the age of 62. Her brother, in his usual health, came in from his

garden, sank down on the sofa and died almost instantly of "heart disease" at the age of 72. A daughter of this same lady, aged 21, died suddenly of "palpitation of the heart," while crossing the ocean, and a niece died also of disease of the heart, and also both grandfathers of this niece.

Up to the moment of attack this lady had not discovered to herself or her friends any unusual feebleness of the pulse, as we should anticipate in fatty degeneration or muscular atrophy.

She had no appearance indeed of hypertrophy of the heart, as we would naturally associate with such regurgitation. She had no dyspnœa to indicate pulmonary complication. The inflations of the lungs were free and full, and the aeration of the blood about as usual. As stated before, there was entire absence of the usual symptoms of local inflammation of any organs. It seems to me that this is another case pointing strongly to the conclusion entertained by so many, that while it *may* be closely associated with organic lesion of the heart, yet that it is essentially neurotic in its character.

Reviews and Bibliographical Notices.

I.—ERB: DISEASES OF THE NERVOUS SYSTEM.

I. HANDBUCH DER KRANKHEITEN DES NERVENSYSTEMS. ERSTE HAELFTE: KRANKHEITEN DER PERIPHEREN CEREBRO-SPINAL NERVEN. Von Dr. W. Erb, Professor an der Universitaet Heidelberg. Pages 554. Leipsic, 1874. (*Diseases of the peripheral cerebro-spinal nerves, etc., etc.*)

This is the first volume to appear in relation to the nervous system, of Ziemssen's *Handbuch der Speciellen Pathologie und Therapie*, now in course of publication at Leipsic. It is written by Prof. William Erb, of Heidelberg—the colleague of Wundt and Friedreich—one of the most accomplished clinical neurologists in Germany.

The only work that has recently appeared, that can be fairly compared with it, is the truly admirable *Lehrbuch der functionellen Nervenkrankheiten*, of Eulenburg, of Berlin. The two very much resemble each other, and treat the same subjects from similar points of view. They are both practical in character, and are alike good specimens of a clear and pleasing style, not infrequently wanting in works in the German language.

To come at once to the subject of the present volume, we feel bound in the outset, to object to its title, "Diseases of the *Peripheral* Nervous System."

Under this title, very many pathological modifications of sensibility and motility, and even certain neuro-trophic disorders, are gathered. But is so large a majority of the forms of neuralgia, of hyperæsthesia, or of anæsthesia, of paralysis, and of many convulsive disorders, and so on to the end of the list, to be regarded as diseases of the "*peripheral*" nervous system, as they are declared in the title of this work to be?

What does this word "peripheral" mean, as applied to the nervous system in anatomy and physiology? It is a discriminative term used to designate the conducting cords, whose office it is to connect nervous with non-nervous parts, in contrast to the nervous centres—or the essential seats of nervous activity. This system of cords, we repeat, is called the *peripheral*, while the central masses with which they stand connected, are called the *central*, nervous system. Viewed from this stand-point, the term "peripheral" is misapplied in the present work, because only a

very limited number of cases of such diseases as are treated of in it, depend solely or chiefly on injury or disease of the peripheral nerves. Most cases acknowledge more or less completely a *central* origin, or at least require participation of the centres. And if so, how shall we call them, in strictness, *peripheral* diseases? If the meaning is, that those central diseases of the nervous system are to be referred to alone, in this work, which are manifested only in a peripheral, or objective way, still the title of the work would be defective; because, perhaps a majority of central diseases of the nervous system give rise to outward symptoms. What we object to is, the partially superficial and confused distinction suggested by the title under consideration—a distinction which is not faithfully carried through the work, simply because it cannot be. Such a want of congruity between the title and the subject matter of a work, is suggestive at the outset, to the attentive reader, of a certain want of precision in analysis, and of looseness in the use of language; which, though it is so common in medical works, is none the less to be deprecated, especially when it is met with in the writings of the masters and teachers of our profession.

In the brief general introduction of less than two pages, the very first paragraph would seem to have been written under the misapprehension that we have tried to point out. In this introductory chapter, our author notices the contrast, on the one hand, between the marked progress that has been made in respect to the observation and more precise delineation of clinical nervous phenomena, and nervous therapeutics; and, on the other hand, the backward state of the pathological anatomy of nervous diseases. Next the value of the common division of nervous diseases into "functional" and "organic," or "anatomical," is discussed, and provisionally adopted, with the expression of something more than a hope that the former may be speedily transferred to the latter class.

Then our author passes at once to his subject, "functional disorders (neuroses) of the peripheral nerves." Under this general head, we have discussed first, "neuroses of the sensory nerves." Some considerable space is given at this point, to the general physiology of sensation, as an essential background against which appropriate pathological phenomena may be brought into relief. Here we have considered, irritation of various degrees, of the different sensory regions of the body; irritants or excitants of various kinds; the modes and degrees, qualitative and quantitative of their action; the centripetal impulses which their action awakens in the sensory nervous apparatuses; their transmission to the sensory centres; the impressions made on them; and the various modes at the centres of disposing of these impulses, especially in a reflex way, along the outgoing motor, vaso-motor, or secretory tracts of nerves; or finally the cognizance of the change wrought in the sensitive centres by the conscious mind—all these points are briefly, but

clearly and judiciously discussed. In speaking of pathological phenomena under this head, Dr. Erb notices next in order, the frequency with which anomalies, as regards the strength of sensations, are met with. These, it is said, may depend on intrinsic changes in the irritability of the sensory conducting apparatus. Here may be noted, first, increased irritability, so that the application of a slight irritant produces a sense impression, naturally disproportionate to its strength; or in other words, there is hyperæsthesia. Dr. Erb appears to say in regard to this matter, that the sole organic seat of the morbid process, may be either "in the peripheral terminal apparatus," or in "any part of the sensory conducting tract." The organic disease of the peripheral nerve in this view, must increase its conductibility (neurility), and hence multiply as it were, the strength of the original impulse, produced by the excitant, so as to deliver an exaggerated, even a painful impression on the related centres.

Here we must pause to make a few remarks. It is well known that by disease or injury, the conductibility of a nerve-fibre may be diminished or even destroyed. But what real proof have we, that by disease or injury, the conductibility of a nerve-fibre may be so greatly increased above the normal capacity of a healthy fibre, as to enable us in this way to account for extreme cases, or indeed, any cases of hyperæsthesia?

We know of none to which fair objection may not be made. There is a much more natural or less objectionable way, for explaining the so-called peripheral hyperæsthesias, than that of assuming the conductibility of the related nerve-fibres to have been increased. It is to suppose that by reason of the disease or injury of the peripheral sensory fibre, that a morbid influence has passed from the points of lesion to the sensory cells to which the fibres go, and has so acted on them as to augment their sensitivity to such a degree, that where sense impressions are made on them, even of less than normal intensity, they give rise to an unnaturally exalted sensation. The centres are the real seats of sensibility, and if it is doubtful whether the conductibility of a nerve-fibre can be *augmented* by disease, there can be no doubt as to whether the sensibility of a centre may be increased by the same means. In every case of "peripheral" hyperæsthesia, so far as we are able to see, the question may be fairly raised, whether the centre does not participate in the morbid process in a manner so vital, as to render it at least doubtful, whether the view apparently maintained, not alone in the present connection, by Erb, is not erroneous?

We dwell on this point because it is an important one. It is certainly worth while to try and fix definitely the true anatomical seats of such morbid processes or conditions as are considered in this work. But it appears almost certain, that the placing so large a number of cases of nervous disease to the credit of the peripheral as contrasted with the central nervous

system, is founded on an incomplete, if not an erroneous analysis, and is therefore not tenable.

Erb objects (p. 9) to Eulenburg's divisions of pathological forms of sensibility, in which a laudable attempt is made to conform to the physiological distinctions made: as between the senses of pain, and of touch, etc.; for it is well known that rare as such cases may be, that they do occasionally occur; in which for example, either the sense of temperature, or the sense of pain, or even that of touch, is abolished, in a part, leaving other forms of sensibility intact. Certainly such cases are worthy of a distinctive name in an exhaustive classification of lesions of sensibility. It is to the attempt of Eulenburg to give a more refined and precise nomenclature for such lesions, that Dr. Erb objects. But the objections do not seem to us in the main well founded. Whatever exceptions may be taken to the terminology of Eulenburg, on etymological grounds, his endeavor is in the right direction, and is too lightly estimated by our author.

To aid in explaining morbid phenomena under the present head, as well as others, our author announces the now well-known physiological laws, fully carried out in the domain of neural pathology, first perhaps, by Romberg, namely: The law of "Isolated Conduction;" the law of "Eccentric Projection;" the law of "Irradiation;" and the law of "Reflexion." It may not be out of place to state these important laws, briefly:

1. The law of *Isolated Conduction.*—This declares the fact, that if an impression is made on a healthy nerve-fibre, in any part of its course, that the impulse the fibre receives is conducted on it exclusively, to its termination in a definite point of the gray matter of the centre to which it leads, if a sensory nerve, and so in kind if a motor nerve. It cannot be transferred laterally to other fibres, but of necessity must follow the course alone of the one on which the impression was first made. On this law, perhaps, more than on any other, does the definiteness of our knowledge of the nervous system, for physiological and pathological purposes, depend.

2. The law of *Eccentric Projection* is to this effect: No matter on what part of the course of a sensory nerve-fibre an impression is made, it is always referred to the peripheral termination of the fibre; and this is true, even for those impressions that are made at the point of implantation of the fibre in the gray matter. They are all referred by the percipient mind to the periphery of the nerve, or are mentally projected as it were, to the extreme peripheral limits of the related part of the nervous system. This is one of the most important laws to be remembered and referred to, in the clinical investigation of nervous diseases.

3. The law of *Irradiation.*—This is simply the statement of the fact, that where an impression is made to pass along a sensory nerve-fibre to a nervous centre, that it often happens that the impression made on the centre, is not confined to the cell or

cells in which the fibre terminates, but that it may radiate or spread laterally to other cells that have sensory fibres terminating in them, coming from other parts of the body. The changes produced in these latter cells are similar to those produced in the former, and as they are felt by the percipient mind, are referred, according to the law of "Eccentric Projection," to those parts of the body from which the sensory fibres come, that terminate in the cells in which the above-mentioned secondary changes were wrought, by "Irradiation" from the group of cells primarily affected. This is also a very fruitful law in the domain of pathology, as could be proven by a multitude of examples that come under it.

4. The law of *Reflexion.*—As well as this law is known in its general expression, or as applied within narrow limits, we wish to say in this place, it is our impression that but few writers have pushed it as far or as industriously, either in physiology or pathology, as it deserves to be, even in the very highest parts of the nervous system.

Under this head, of course, the well-known laws of nervous reflex action, of Pflueger, are to be remembered, but they are not in this place mentioned by Dr. Erb. A discussion then follows of "sensibility" in general, as it belongs to the nervous system, which appears on the whole, clear and useful, though brief. Particular attention is given to "common feeling," or "common sensation" (Gemeingefuehl), and its varieties, especially to the "sense of pain," and its abnormal relations. But it will not be possible, in this place, to follow our author in his judicious and practical remarks on this subject.

Pain is defined to be that form of "common sensibility which is concerned not with the *kind*, but the *degree* of sense impressions." Or, stated from a little different stand-point, "every increase in the action of an ordinary or natural irritant, may produce pain, when it has reached a certain degree of intensity. Every irritative process that shall exceed a certain intensity, all molecular changes in the sensory conducting tracts called forth by abnormally strong irritation, may be expressed in the consciousness as pain. * * * The simplest expression seems to be, that pain is the reaction of consciousness to a certain definite strength of nervous excitation or irritation, and we can see no *a priori* grounds for ascribing pathological pain, to an essentially different origin than for that arising as the result of simple physiological experiment" (p. 14).

After having analyzed the process of sensation physiologically, our author enters on a more particular examination of certain parts of the sensory nervous apparatus. He refers to the spinal cord in particular, and considers as now pretty well established, the now rather old, but not well-known opinions of Schiff, that the paths in the spinal cord for the conduction of the sense impressions of *touch*, are in the posterior white columns, while the tracks for the conduction of painful impressions are in the

gray matter of the cord. Such opinions as these, if well founded, have great importance in pathology.

In every case of pain, according to Dr. Erb, two questions confront us alone, as regards the immediate condition on which it depends: There is either an unnaturally strong action of some irritant, or there is an unnatural degree of irritability of the sensory tracts of the nervous system (hyperæsthesia). With such a background he begins the consideration of neuralgias.

Dr. Erb declines to define the word neuralgia, and passes to a consideration of its characteristics.

He ignores, very properly, in great measure, the division of neuralgias, into *idiopathic* and *symptomatic*.

He gives as the most important characteristics of a neuralgia, the following: "Limitation of the pain to a definite nerve trunk or branch, and its ramifications; course of the pain along this nerve trunk; pain spontaneous, or not to be referred to any apparent external cause; paroxysmal occurrence of the pain, with clear intermissions, or at least remissions; the want of local organic disorders, with the exception of those belonging to the nervous system itself; and finally, the absence of important general phenomena."

He holds as valueless for diagnostic purposes, the characteristic laid down by Bretschneider and others, viz.: that the pain of neuralgia is increased by slight, and decreased by firm pressure. Neuralgia is declared to be only a symptomatic form of disease, and is distinguished from hyperæsthesia, purely as such. But Dr. Erb does not seem to us, to clearly state, even if he recognizes the true nature of the difference that he points out. Here comes into play the physiological distinction between the senses of touch, and of pain, etc. Neuralgia consists in an increase in sensibility to painful impressions, on account of disease or injury of the sensory nervous apparatus. Hyperæsthesia consists in an abnormal increase, not of sensibility to pain or painful impressions, but in the sense of touch or of contact. If these statements are true, it should be possible for us to meet with cases of neuralgia, in which the sensibility to touch or contact is diminished in the affected nerve, and *vice versa*. And such is actually the teaching of experience. It is almost the rule, for example, in severe trifacial neuralgias, to find a blunted sense of touch, in parts supplied by the affected nerve. Such cases, it seems to us, should point out the nature of the distinction that should be made, as between neuralgia and hyperæsthesia.

In discussing the ætiology of neuralgia, he divides its causes, under the two well-known categories of *predisposing* and *occasional*, or *exciting*. Under the former head, he considers first of all, the "*neuropathic disposition*." This "disposition" may be hereditary or acquired.

To the former, Dr. Anstie called emphatic attention, and Dr. Erb does full justice to this lamented author's views. Next the influence of the "period of life" on neuralgia, is discussed. The

fact is noted, but not discussed as it deserves to be, that the period of childhood is almost free from neuralgias. This is a most instructive fact. Why should the period of childhood, during which the nervous sensibilities are so keen, yet be so free from such pathological modifications of the sensibility to pain, as the neuralgias are? We cannot now tarry to discuss this question, but assure our readers, that it will amply repay examination.

In respect to the influence of sex on the occurrence of neuralgias, the experience of Dr. Erb differs from that of most other observers, in that he has found males rather than females to present the greater number of cases.

Dr. Erb agrees with Anstie, and others, that the "neuropathic disposition" is much influenced by the kind of culture the person receives. The influence of general disorders of nutrition, leading to anæmia in its various forms, is considered as one of the most fruitful predisposing causes of neuralgia. But, though the importance of this cause is admitted, it does not appear to have the stress laid on it which it deserves.

Dr. Erb agrees with Anstie, that the degeneration of nutrition which belongs to the period of senility, is under the head of disorders of nutrition, perhaps the most important.

Then follows a very full discussion of the "exciting" causes. In the whole range of the literature of neuralgia, we do not know of a more instructive list of such conditions or causes. We would be glad to extract passages from this portion of the work, but our space will not permit it. We would heartily commend this section of the work to the attention of our readers. All forms of traumatic and mechanical injury of nerves, whether accidental or surgical, leading to subsequent neuralgias, all kinds of autopathic pathological change of nerve trunks, the action of cold, of infection and intoxication, especially malarial, all forms of dyscrasic disease, such as the "rheumatic," "arthritic," "syphilitic," etc., all central affections of the nervous system leading to neuralgias, all peripheral irritations, such as proceed from diseased teeth, overstraining of the eyes, excessive irritation of the genital organs, etc., are all practically considered in their causal relations to neuralgia.

In the next place, Dr. Erb enters upon the pathological anatomy and pathogenesis of neuralgias. Here it will not be possible for us to follow our author at length. The conclusion he reaches is as follows: "In neuralgia, we have to deal with a quite definite and peculiar form of disorder of nutrition of the sensory nervous apparatus" (p. 34). We think in the discussion had in this chapter, Dr. Erb gives too small a place to *inference.* He is disinclined to admit anything which is not susceptible of physical demonstration. In the conclusion of this chapter, critical remarks are offered on the views of Anstie, as to the posterior roots of the spinal nerves being the usual organic seat of neuralgias, and, we think with justice, are rejected.

He also partially rejects the view of Benedikt, that neuralgias depend, as a rule, on a neuritis. He does not fully accept either the views of Niemeyer or of Eulenburg, as to the necessity of organic changes in the structure of the affected nerves, as one of the necessary conditions of a neuralgia.

Dr. Erb now passes to a very full, if not exhaustive review, of the symptoms of neuralgia. After a short general statement, he proceeds to an "analysis of separate symptoms," the first being *pain.* Here amongst other points, he discusses the diagnostic value of the painful points (*points douloureux, Schmerzpuncte*) of Valleix. He agrees with most other recent writers, as Romberg, Schuh, Hasse, Eulenburg, Trousseau, Anstie, etc., that they have but little, if any real diagnostic value. The tender spots found at the points of emergence of a neuralgic nerve trunk from a bony foramen, or a layer of fascia, he would either agree with Anstie as owing to vaso-motor disorder, or to disease of the *nervi nervorum* of the affected nerve trunks. Our author considers in the next place, the phenomenon of the irradiation of the pain from the affected nerve trunk to other trunks closely related anatomically. In explaining how this may occur, Dr. Erb is forced to go back to the nervous centres, and to admit them to a participation in the morbid process, in a sense that shows how unsuitable the title of his work is, when applied to such forms of disease as we are now considering.

As regards the existence of anæsthesia or hyperæsthesia, in neuralgias, our author shows from his own observations, as well as those of others, that while either may exist at any stage, yet the former is the more common, especially in cases of some duration.

The morbid motor phenomena, whether *direct* or *reflex*, which sometimes accompany neuralgias, are next discussed; but under these heads are no new observations of value.

Attention is called to the diminution in force and frequency of the pulse during the paroxysm of neuralgia, observed by Tuerck and Anstie, but no attempt is made to explain the mechanism or mode of production of such phenomena.

Dr. Erb next examines, and at some length, the "vaso-motor accompanying phenomena" of neuralgia. In some cases, as in neuralgia of the ophthalmic division of the fifth pair, there is reddening of the eye; enlargement of the vessels; while in others, as in the "hemicrania sympathico-tonica" of Du Bois Reymond, and others, there is the opposite condition of the vessels of the affected parts. Our author thinks these phenomena may be produced in either a direct or reflex way, but enters on no explanation of the vaso-motor apparatus on which such phenomena depend. But we believe, notwithstanding the remarks of Dr. Erb to the contrary, that these cases are susceptible of at least partial explanation, but we have no space in which to enter on such an explanation now. The same remark may be made in respect to the secretory phenomena that accompany or follow neuralgic attacks. It seems to us, the connection between the

two classes of phenomena may be stated in a more satisfactory manner than Dr. Erb appears willing to admit.

Next in order come "accompanying trophic disorders," such as changes in the color, and an increase in the number and thickness of the hairs of parts that are the seats of neuralgias, increased pigmenting of the skin, increase and thickening of the tissues, atrophy of the same, inflammatory changes, local in character (especially certain irritative affections of the skin, such as *erythema*, *urticaria*, *pemphigus*, *herpes zoster*, etc.), and irritative affections of the eye, such as the *ophthalmia neuro-paralytica*, arising apparently in consequence of neuralgic affections of the trigeminus, and certain forms of *glaucoma*, and also *iritis*. Dr. Erb enters briefly into a discussion as to the existence of the so-called "trophic" nerves, and is clearly inclined, and we think properly so, to admit their existence. He mentions briefly the contrary views of Mitchell of our own country, Cohnheim, and especially those of his colleague, Friedreich, of Heidelberg, who more strongly than any recent writer, combats the notion which admits the existence not only of trophic nerves, but even of nervous trophic action. But the views of this latter writer were noticed at some length in a review of his work on *Progressive Muskelatrophie*, etc., in the October number of this journal for the past year.

Attention is next given to the accompanying psychical disorders of neuralgia. They are declared to be rare in any form; and when present, are confined almost exclusively to emotional disorders, such as "general irritability, melancholy, tendency to suicide," etc. He, however, mentions a case of Descot's, obtained through Bretschneider, in which severe mental disorder arose as a consequence of a traumatic neuralgia. We have at this present time under observation, a case in which a trifacial neuralgia is exchanged at times, for delusional insanity, and *vice versa*.

Some inquiry is next made as regards the "general disorders" to which neuralgia may give rise. To illustrate this point, certain seemingly cruel experiments of Mantegazza, are referred to, in which animals were made to suffer severe pain for protracted periods, that its apparent effects on their nutrition, etc., could be observed. There was loss of appetite, failure of gastric digestion, etc.; and further on, emaciation, great weakness, very great sensibility to the action of external agencies. These results agree, so our author declares, with those observed to follow in the wake of protracted neuralgias. The cause or causes of periodicity in neuralgic attacks is discussed, but in an unsatisfactory manner. Upon the whole, and in spite of the statements of Benedikt and Eulenburg to the contrary, Dr. Erb does not believe we can learn anything reliable or constant, as to the seat or kind of a neuralgia, by means of electrical investigation of the affected nerves.

Next in order, are remarks on the *course* of neuralgias, but

there is nothing new of importance given under this head. The chapter following, on *diagnosis*, is an excellent and practical one. In the first place, the characteristic marks of a neuralgia are given, and then a parallel is drawn between neuralgia and "myalgia," "muscular rheumatism," "spinal irritation," pains in consequence of "chronic intoxication" from alcohol, "quicksilver," "lead," etc.

But we cannot, in the space at our command, profitably follow our author in the critical part of his discussion on the diagnosis of neuralgia. No mere abstract can do it full justice, or would satisfy the reader. Moreover, there are some statements in this chapter to which we object, as fundamentally erroneous, as respects the pathology of neuralgia. In the majority of cases the prognosis is to be looked upon as good for recovery.

Finally, we come to the general therapeutics of neuralgia. This is a full and suggestive chapter. Dr. Erb very strongly insists on a highly nutritious diet, which should include fats, but especially cod-liver oil. To this recommendation, though it is not novel, we would add our emphatic endorsement; also, he insists on the necessity of much sleep. This point we believe to be one of the most important of all measures in combating neuralgias.

Then again, he insists on as nearly as possible absolute rest for the affected parts. This, also, is of the highest importance. We wish, at the risk of reiterating an old story, to insist on these three points in the management of neuralgias: the best possible supply of nutrition; the most complete rest of the affected parts; and a full measure of sleep.

Very properly, Dr. Erb insists on a careful study of the *indicatio causalis*, as one of the best guides to rational treatment; and also the *indicatio morbi* or *symptomatica*.

He would have the patient avoid stimulants and all excitement. As one of the chief medical means of combating local neuralgias, Dr. Erb would name electricity. On this subject, but few men living are better qualified to speak than is our author, since he is one of the most prominent medical electricians in Europe. He employs both the faradic and galvanic currents, but prefers the former for superficial neuralgias, and the latter for those that have a central seat. Specific indications and directions for the employment of electricity are given, in which the various methods of different electro-therapeutists are canvassed.

In this connection, mention is made of the plan of "central" or "general" electrization, of Beard and Rockwell. While the plan is mentioned with approval, doubt is expressed as to the real place that should be assigned to it, until it has been farther tried.

Then follows a general consideration of narcotics, not only as a palliative, but as a curative means. He doubts whether narcotics are useful in the latter respect. The favorite method, as might have been expected, is that of hypodermic injection. Morphia stands first on the list of narcotics, as against neuralgia. After

morphia, atropia is referred to briefly, and the experience of Anstie is referred to in respect to its happy action in glaucomatous and in pelvic neuralgias; but in the main, the cases must be few, in which atropia alone will prove most useful. He mentions in one line, the hint of Althaus, as to a combination of morphia and atropia being of value in the disease in question.

For our own part, we desire to speak from a very considerable experience of the value of a combination in the same mixture of morphia and atropia, in the proportion of one grain of the latter, to sixteen to twenty-four of the former, to an ounce of distilled water, and then given hypodermically, in suitable doses to relieve the pain. We know of no combination of narcotics so valuable in cases of neuralgia, and at the same time attended by so few ill consequences. We have often added to this with advantage in particular cases, from solutions of caffein, or strychnia, and with excellent effect.

Hydrate of chloral, he decides in conformity with the experience of many others, to be of little value, unless associated with some narcotic such as morphia. We have found its use excellent for procuring protracted sleep, after a preliminary hypodermic injection of a dose of the solution of morphia and atropia already referred to. As to other narcotics and the anæsthetics, Dr. Erb believes the range of their usefulness so small, that any special mention of their action would be devoid of utility.

Under the head of so-called "specifics," arsenic is assigned the first place, very naturally, in the "typical" or periodic neuralgias. Under this head, very brief remarks, too brief, relatively speaking, are made on phosphorus, iron, quinia, strychnia, the bromides, etc.; all these agencies, except the last, appear to us to rightfully demand a fuller consideration than Dr. Erb has given them.

Some space is given to the consideration of (*Ableitungsmittel*) "derivative means" or agencies, such as faradization of the skin, the actual cautery, moxas, emplast. canthar., croton oil, tartar emetic ointment, etc.; but all such means he thinks are useful, if at all, in slight or recent cases of the disease, or in young persons. He would lay no inconsiderable stress on the use of baths of various kinds, especially the mineral baths in such waters as those of Ragatz, Wildbad, Gastein, Wiesbaden, Teplitz, Leuk, etc. Then our author passes to a brief consideration of mechanical or surgical means for the relief of neuralgia, such as compression of the affected nerve trunks, neurotomy, and even the amputation or exarticulation of the member to which the affected nerves belong. The temporary or even permanent diminution of the blood supply of affected parts, after the practice of Trousseau, Nussbaum, and Patruban, is mentioned but not heartily approved. Finally, we have a brief "Nachtrag," embracing supplementary general remarks on the management of neuralgias, and this terminates the general part of this most important and interesting of all the divisions of the work, and of which we

have endeavored to give a summary. After this general, comes the *special* part, relating to local neuralgias, beginning with those of the trigeminus and extending through to neuralgias of the joints. We have only space to say that in the whole range of neurological literature, we know of no work in which a more satisfactory discussion of the various special forms of neuralgia is to be found than is contained in the chapters under consideration in this volume. For clearness of description, fullness of detail, in moderate space, freedom from vain speculations, and for practical good sense, we have met with nothing in its way superior to this work of Dr. Erb.

Following the "Neuroses of Cerebro-spinal Nerves," of common sensibility, is an interesting chapter on "Neuroses of the Nerves of Special Sense." But we have no space in this number in which to notice it in detail. Neither is it possible at this time to consider the very important chapters on "Anæsthesia," or on "Convulsive Affections," or in relation to the many forms of paralysis, considered in general or in particular, or the final chapters on "Anatomical Disorders of the Peripheral Nerves," including "Hyperæmia of the Nerves," "Neuritis," acute and chronic, in all its actual and probable relations, "Atrophy of the Nerves," and finally "Hypertrophy of and Neoplastic Formations in the Nerves."

These parts of the work are worthy of all attention, and may be the subject of another paper in a future number of the Journal.

It is with sincere pleasure that we regard the existing prospect that this admirable work is soon to appear in an English dress, when it will be accessible to a larger class of readers than at present. Most heartily do we commend it to every one who feels an interest in possessing a work of the highest class in respect to diseases of the nervous system.

II.—HEUBNER: SYPHILITIC DISEASES OF THE CEREBRAL VESSELS.

Die Luetische Erkrankung der Hirnarterien, nebst allgemeinen Eroerterungen zur normalen und pathologischen Histologie der Arterien, sowie zur Hirncirculation. Eine Monographie von Dr. Med. O. Heubner. Mit 4 Tafeln. Leipzig, 1874, pages 236. *(Syphilitic disorders of the arteries of the brain, with a general discussion of the normal and pathological histology of the arteries, etc.)*

It is only in recent times that much has been done to advance our knowledge of syphilitic affections of the nervous system, more particularly of the brain. Among the latest contributions

to the literature of such affections, this of Dr. Heubner's is among the most noteworthy.

It is no part of our purpose at present to enter on a history of progress in this respect, but rather to proceed at once to a discussion of the contents of the present work.

The first chapter, comprising thirteen pages, is historical, and is full and satisfactory. One of the chief impressions gained in reading it, is that the general opinion has been among investigators that in syphilitic affections of the brain the arteries are chiefly, if not exclusively, their seat.

The next chapter is statistical, and evidently is the result of much literary research. The number of cases collected of syphilitic disease of the contents of the cranial cavity is 164. These are analyzed as follows:

In 68 cases there were various neoplastic formations (Neubildungen), with or without softening of the brain, and in which there was no mention of disease of the vessels. In 36 cases there was simple meningitis, or encephalitis, atrophy of the nerves, and the like, mentioned, but in only two cases was there express mention made of the condition of the vessels. In 16 cases there was no apparent disease of the nervous system. In 44 cases there were syphiloma, or inflammations, or, without other extra vascular changes, various lesions of the vessels, such as thickening of their walls, obliteration, thrombosis, etc.

Dr. Heubner next gives the names of the authors, and dates of their observations, from whose writings he is indebted for such of his cases as he has not contributed himself. This list includes only the first three categories of cases, as mentioned above. In the fourth category of 44 cases, in all of which disease of the vessels is mentioned, he not only gives the names of the authors, but full abstracts of the reports. This "Casuistik" of cases, together with his own, and the discussions to which they give rise, occupies the remainder of the work. The cases are ranged in a chronological order, the first being from Virchow (*Gesammt. Abhand.*, s. 414), 1845. They are divided into several groups, as follows:

First.—Cases in which the disease of the arteries has a doubtful syphilitic origin. Also cases in which the syphilitic neoplastic formation either invests an artery, or lies in contact with its walls. Of the whole number of cases, 44, ten belong to this group. The actual condition of the arteries of the brain in these cases, so far as the generally imperfect *post-mortem* examinations made will enable the author to determine, is mentioned for each case. The results may be thus summarized:

1. In two cases the artery was reported to have been involved in a mechanical way. There was compression, contraction, thrombosis, but no reported structural change in the arterial walls, resulting from the proximity of the syphilitic growths.

2. There were four cases in which the arterial walls were distinctly involved in the disease, but only at the point of contact.

3. In two cases the disease not only had affected the artery at the point of contact of the gummatous growth, but had followed along the vessel beyond its limits.

In one of these last cases other parts of the vascular system were submitted to microscopic examination—the aorta, for example; but there were no morbid changes to be found, save in the vessels of the brain.

Second.—This group is formed of those cases in which the syphilitic growths did not stand in any close relation to the diseased arteries, being in part on contrary sides of the brain. The question arises whether in those cases in which the arterial walls are degenerated, so as to be changed in texture, and to lead to the gradual accumulation of matter on the inner surface of the diseased vessels, obliterating them more or less completely, and producing thrombosis—the disease is not simply atheromatous, and not syphilitic. But after reading the discussion of Dr. Heubner, there can be little if any doubt that the cases he cites belong to the class of true syphilitic affections. That there may be and frequently is syphilitic disease of the arteries of the brain there would seem to be no room left for doubt.

Third Group.—This is by far the most numerous, and consists of those cases in syphilitic individuals who died during either the so-called secondary or the tertiary epochs of the affection, and in which, generally, no specific changes were found within the cavity of the skull, such as gummata, cheesy spots, etc., but in which there was softening or inflammation, and also, either circumscribed or extended changes in the arteries.

A detailed analysis and critical discussion of these cases follows in the next few pages, chiefly intended to show that many of them at least, were not liable to the objection that they were cases of atheromatous, rather than syphilitic vascular disease. The cases described show various lesions, such as thickening and degeneration of the walls of the arteries, proliferation of the tissue of the middle coat, so as to cause swelling inward of the artery, in this way contracting the diameter of the vessel; chalky and other deposits in the walls of the diseased vessels, thrombosis, softening of brain substance in the region of the affected vessels, etc. Such were the principal lesions observed.

Then Dr. Heubner presents us with remarkably full and interesting reports of three cases of his own, embracing their histories, both *ante-* and *post-mortem*. These reports are models in their way. They embrace with great particularity every point that the most penetrating criticism could reasonably require. Especially is this true of the *post-mortem* appearances, both positive and negative. We would recommend all who have the opportunity to conduct such investigations, to read these elaborate and masterly reports of Dr. Heubner's.

These cases are followed by critical discussions (*epikrise*) which have great interest, but we pass them by, to take the reader at

once to the discussion occupying the latter half of the volume, where we find the substance of the work summed up.

The third chapter of the book (p. 124,) is occupied in a careful discussion as to "the anatomical character of syphilitic affections of the arteries." The precise original seat of the morbid process in the arteries, is in the deeper part of the *endothelium* of the vessel, and the corresponding part of the *membrana fenestrata*, on which the cells of the endothelium are planted. From these points the disease may and often does extend, so as to involve more external structures, such as the middle coat, &c.

Early in this chapter Dr. Heubner enters on a careful statement in respect to the normal histology of the coats of the arteries. He reviews briefly the investigations of Eberth, Henle, Koelliker, Risse, Langhans and others, agreeing in the main to the results of the last named observer. Dr. Heubner prefers in every respect, the so-called Mueller's fluid, as a means for preserving and hardening the arterial coats, preparatory to microscopic investigation.

In respect to larger arteries, such as the aorta, the difficulty is noticed which exists in the endeavor to distinguish between the normal and thickened "intima," of the fenestrated arterial coat.

The best criterion, however, is decided to lie in the cells of the "intima." The cells of the normal are smaller than those of the diseased intima. Then again the inner surface and middle layer of the intima presents a great many striæ, or a fine fibre-like appearance, that becomes far less pronounced as the outer normal layer of the intima is approached. There is, in short, increase in the size of the cells, and proliferation of the fibre structure of the diseased, as compared with healthy parts of the coat in question.

The spaces between the fibres and cells, in the abnormal parts, are filled in with a more or less transparent, slightly refracting, homogeneous substance, except that in some cases it is clouded by small granules. After describing the above appearances, Dr. Heubner next calls attention to certain peculiar points, which the outer surface of the intima presents, at its point of contact with the media or muscular coat. But they have not the peculiar interest which would justify their mention in this place. The final result of the histological examination of the intima, is to the effect that it is chiefly composed of connective tissue cells. The cell element of the intima is far the most pronounced in the inner or endothelial surface, and by consequence it is most subject to become the seat of morbid processes.

The examination of the carotid is next made. Much the same structure is found in it as in the aorta, but with smaller spaces between the fibres, and with fewer cells. Indeed, the smaller the vessel, the less pronounced is the intima and its histological elements

The final result of the examination of the relation of the endothelium to the intima, is to the effect that in the smaller arteries at the base of the brain, followed until we reach their final

distribution in the pia mater, that they are not separated from each other by any intermediate layer of tissue, as is the case with the larger arteries. The endothelium rests immediately on the proper structure of the intima in the smaller arteries of the brain. In at least two of the cases investigated with extreme care by Dr. Heubner, the structural disease was found to have begun invariably, *in the point of contact of the endothelium and intima*, and from this point to have spread so as to involve other parts. The first morbid appearance is the intrusion between the endothelium and the intima, of a protoplasmic granular layer. The question as to the origin of this granular layer is discussed. The view that it may depend on the migration, (*diapedesis*,) of infected white blood-cells, is rejected. The conclusion finally reached is, that the disease of the arteries, notwithstanding its appearance in the position already mentioned, really arises in the cells of the endothelium, and extends from them to the *intima* or fenestrated membrane beneath them. A most minute and painstaking description (illustrated by drawings,) of the various morbid appearances of the endothelium, is entered upon, as a basis for the opinion expressed above, as to the true *fons et origo mali*, in the arteries. The disease once seated in the small arteries of the brain in the place described, may extend to their outer coats, or even beyond them, and by the accumulation of matter at the seats of morbid action, press the endothelium inwards, or even throw it off entirely, so as to encroach on or even occlude the calibre, and thus interrupt the flow of blood through the vessels, leading in this way to all the evil consequences of thrombosis. The immediate cause of the irritative disease of the cells of the endothelium, is presumed to be the syphilitic virus in the blood.

In the various degenerations of the vessels of the brain in these cases, one point seems to have been noticed of much importance in determining the true character of the morbid changes observed in them, viz. : there was almost an entire absence of fat granules among the degenerated structures, as is so common in atheromatous affections of the arteries. But we cannot profitably follow our author farther into these pathological anatomy details in this place. We have dwelt on them to the extent we have done, because they are important ; and being to a certain extent new, and relating to an interesting, and in these times not infrequent and disastrous form of disease, they deserve mention.

In another division of this chapter we have a "comparison of syphilitic affections of the arteries, with the so-called chronic endarteritis, (the atheromatous process) and other analogous processes in the arteries." This is done partly to put at rest the question as to whether the disease of the arteries, described by our author, may not have been, after all, only examples of atheromatous degeneration, and partly with the aim of fixing the real nature of the disease.

At this point the question is raised, why the arteries of other parts of the body are not the seat of disease, the same as those

of the brain, and why the larger arteries are not the seats of this form of disease as well as the smaller ones.

To the first question, it is answered in effect, that the arteries of other parts are, for any thing we know, diseased in such cases. They have not been as diligently examined as those of the brain. To the second question a similar answer is made, and an additional answer to the effect that the difficulty is very great of determining the same changes in the larger arteries, even if they existed, on account of the thickness of the peculiar sub-endothelial layer, which is either very thin or absent in the small cerebral vessels.

The principal points of difference between the syphilitic and atheromatous changes, are said to be the following:

1. Difference as to the duration of the period of development. The former has, often a quite short period, say a few months, while the latter is either unknown, or very long, say many years.

2. Then again, in the beginning of atheromatous disease, the vessel is usually enlarged at the seat of the disorder, while the opposite condition prevails with syphilitic disease of the vessels.

3. The atheramatous affection is more diffused, or involves as a rule larger areas of a vessel than is the case with the syphilitic, which is often sharply limited to small spots in the vessel.

4. The atheromatous and other related chronic arterial affections, especially as seen in old people, have, unlike the syphilitic affection, less the character of neoplastic formations, than of hypertrophies.

5. The presence of fat granules and even large fat cells in abundance in most forms of such diseases as we are now considering, except the syphilitic.

In this connection Dr. Heubner presents us with a very great number of details as to the microscopical appearances of the two forms of arterial disease, that are full of interest, but we cannot notice them in detail in the present paper. Some little space is now given to considering the mode of producing thrombosis, in syphilitic disease of arteries of the brain. Careful mention is made in this connection of the views of Waldeyer, Thiersch, Durante, Bubnoff, Dudukaloff, and others.

In the next chapter the "physiological significance of syphilitic affections of the arteries" is considered. The remarkably free anastomoses of the cerebral arteries is noticed, especially as manifested in the attempts to inject the smaller arteries of the circle of Willis. To illustrate this, Dr. Heubner undertook a series of careful injections of thirty different brains which had been removed from the skull, so as only to divide the internal carotid and vertebral arteries, and to leave the *pia mater* unwounded. In some instances one branch of the circle of Willis and in others another would be taken. He found in every case that when the injection had reached the *pia mater* that it ran with remarkable freedom in the superficial vessels of the *pia*, so as to spread over a much larger extent of brain surface than the injected artery

supplied. This depends on the very free anastomoses of the arteries of the brain in the *pia mater*. It is an admirable means for securing a thorough distribution of blood over the surface of the brain. The arteries of the pia mater run in a direction parallel to the surface of the brain, and give off at right angles to their axes, the very small arteries that penetrate the cortex of the brain perpendicular to its surface. Dr. Heubner found in his experiments that these last-named arteries could only be filled successfully when the artery was injected which supplied the region to which they belonged. If the vessels of the *pia mater* were supplied indirectly from other regions by anastomoses, the pressure in them did not seem to be sufficient to secure a circulation into the small vessels of the cortex. In this way was our author able to designate the particular regions of the cortex supplied by particular arteries.

This is one of the most important parts of the work, and want of space alone prevents us from condensing from it a statement of his practically valuable results. They may be given in the next number of the JOURNAL.

Having shown what particular regions of the cortex are supplied by certain arteries, our author next proceeds to discuss what are the effects of a closure of the vessels supplying special regions.

Dr. Heubner refers first of all to the experiments of Kussmaul and Tenner, and also of Donders, now so well known, especially in their bearing on the pathology of epilepsy. This reference is followed by a detailed and seemingly exhaustive consideration, theoretical and practical, of the physiological effects of thrombosis and embolism, on first the cortex, and second the great ganglia imbedded in the base of the brain. The effects exhibited by the former are declared to be transitory, if one of the larger vessels is the seat of the occlusion, as we see in the transitory loss of consciousness following embolism of cortical vessels, or apoplectic seizures. But these first effects soon pass away, because the changes in blood pressure suddenly produced in this way are soon obviated, by reason of the free communications that exist between different regions of the cortex, through the continuous vascular network of the *pia mater*. An equilibrium is soon restored.

The case is, however, somewhat different as regards the great ganglia at the base of the brain. Here the effects which follow as consequences of thrombosis or embolism, instead of being transitory, are, unhappily, more or less permanent. How shall we explain this difference? Very easily, when we consider the peculiarities in the blood supply of these ganglia, as compared with the cortex.

According to the highly interesting researches of M. Duret (*Archives de Physiolog. Norm. et Path.*), and those of the author, the great ganglia at the base of the brain are supplied, not from the *pia mater*, as the cortex is, but by small arteries, which penetrate directly through this so-called membrane into the masses of

the ganglia, and these vessels establish but very few, if any, collateral anastomoses with each other, but pass directly on, to terminate in the corresponding capillaries and veins. Hence, if one of these arteries becomes closed in any way, there is but little chance to restore the circulation in the parts dependent on it, as compared with the cortex. This is why disturbances in the action of the cortex arising from closure of an artery soon pass away, and why they are more or less permanent in the ganglia. Hence, in part, the importance of a careful study of the vascular system of the brain.

At this point Dr. Heubner, in view of the evident physics of the circulation in the ganglia, and on the data furnished by Cohnheim (*Die Embolischen Process*, etc.), deduces in a very interesting manner the mode of production of the hæmorrhagic infarctions, and other morbid changes the ganglia in question show after closure of their vessels. But here, as in other parts of the work, we have no space for following into details.

Very naturally, Dr. Heubner is led to speak of the paralyses of sensibility and motion which arise as a consequence of thrombosis of the vessels of the sensory and motor ganglia on account of disease (syphilitic) of their walls; but there is nothing peculiar about the paralytic affections produced in the way mentioned, which is worthy of special remark.

From this our author passes to a remarkably minute and satisfactory explanation of the *modus agendi*, from beginning to end, anatomical and physiological, of the morbid processes in the cortex of the brain, arising from disease of the small vessels of the cortex. This chapter affords an admirable exposition of a complicated morbid process, one of the most so to which we can point in the whole range of medical literature. Nothing less than a transfer of the whole account to our pages would be satisfactory to the reader.

The fifth and last chapter is given to "Remarks on the Pathology of the Affection." Of course the substance of this chapter has been given in a diffuse form in foregoing parts of the work. The first section is concerned with the ætiology of the forms of disease under consideration. This is comparatively simple, and is comprised briefly in the remark that the syphilitic poison, when once introduced into the blood, acts on the cells of the endothelium of the vessels, so as to lead, in the way already described, to diseased action and products, between the endothelium and intima, or fenestrated membrane. Neither sex nor age appear to have any influence on the occurrence of the disease.

The next section of this chapter is occupied with the symptomatology of undoubted cases of syphilitic affections of the brain. The most frequent prodromal symptom is pain in the head, so as to prevent sleep in a measure, and next in order is sleeplessness aside from pain. Then again, there is vertigo in many cases, irritability of temper, weakness of memory, various disorders, especially paralytic in character, of motility and sensibility,

not so much of single cranial nerves as in the way of hemiplegias, etc. Several pages are given especially to the symptoms that point to disease of the cortex, but the symptoms belonging to this form of disease do not differ very materially from those of the same parts produced in other ways. Instructive as this chapter is, therefore, we must pass it by at this time But we would recommend heartily its study to the reader. Neither can we give space for a summary of the valuable remarks on diagnosis (pp. 230–232).

As might have been expected, nothing new in a therapeutical way is offered. The treatment that experience has pointed out as the best suited for similar forms of syphilitic disorder in other parts of the body, on the one hand, and for cerebral affections, attended by like symptoms, on the other, is that essentially which is recommended.

Here we must take leave of this admirable memoir. We have seldom met with one in which we have been more interested, or in which has been combined in a more happy manner precise and well-directed observation of fact, and a rare capacity for cautious and critical discussion of the same.

III.—THE CARE OF THE INSANE.

I. Psychiatrische Zeitfragen aus dem Gebiete der Irrenfuersorge in und ausser den Anstalten, und ihren Beziehungen zum staatliche und gesellschaftlichen Leben. Von Dr. C. F. W. Roller. (*Questions for the times in regard to the care of the insane, etc.*) Berlin : 1874, 283 pp.

II. Die Naturwissenschaftliche Methode in der Psychiatrie. Vortrage gehalten in der Berliner Medicinisch-psychologischen Gesellschaft, von Paul Samt, erstem assistant Arzt der Irrenabtheilung der Konigl. Charite. (*The scientific method in psychiatry.*) Berlin : 1874, 60 pp.

III. Wo sind die Seelenstoerungen in ihren Beginne zu behandeln? Oder die Nuetzlichkeit und Nothwendigkeit der offenen Kur-Anstalten fuer Nervenkranke und Leichtverstimmte. Von Dr. Walther in Carlsdorf. (*Where are mental disorders to be treated in their beginnings, etc.*) Neuweid u. Leipzig: 1874, 30 pp.

IV. Les Alienes, dans la Famille et dans la Maison de Sante. Etude pour les Gens du Monde, par Madam M. Rivet, nee Brierre de Boismont. (*The insane in the family and in the asylum.*) Paris: 1875, 308 pp.

We have grouped in the above list several works of widely different scope. They have, however, one thing in common : they all bear more or less directly on the general subject of the treat-

ment of the insane, and for that reason we have combined them for short notice in the present article. They treat of the subject of insanity in general, and not of any special phase or form of the disorder; they are none of them monographs, properly speaking.

Dr. Roller's book traverses the whole subject of what may be called the public medical relations of insanity, the general and special questions in regard to asylums, their form, situation, management and *personnel*, the medical, social and legal relations of the insane, and the prophylaxis of mental disorders. It is noteworthy in several respects: it is the work of a practical alienist of large experience, who is well known as one of the editors of the *Allg. Zeitschrift fuer Psychiatrie*, one of the oldest and best known journals in this department of medicine in the world; the questions it treats of are practical ones, and though perhaps a part of what is said applies to Europe rather than to this country, the subjects discussed are of interest to every physician who has to treat or in any way to do with the disorders of the mind. We can only notice a few of the points it makes at any length.

The first six of the thirty sections of the book are devoted to the consideration of the different plans of asylums and systems of management of the insane. The most notable feature in these sections is the author's protest against the more narrow and materialistic view of insanity as expressed by Griesinger and others. Griesinger had laid down as a fundamental proposition that "the so-called insane are persons suffering from brain and nerve disease," and had on this ground objected to the present system of exclusive hospitals for such diseases. Dr. Roller, while admitting that insanity is to be reckoned as a nervous disease, still holds that it is also something more, and that a truer statement than that of Griesinger would be one that recognized something peculiar, apart from mere somatic disturbance, in mental disorders. He ranges himself decidedly among those who, while admitting the physical disorder, still consider that the conception of insanity is not complete with this statement; that it includes phenomena not present in ordinary nervous disease, and peculiar in their character and in the treatment they require. The asylum for these disorders must therefore be different from other hospitals; the insane are not to be treated as simply physically diseased. The author says: "We have to thank the modern asylum for all our psychiatrical knowledge, and yet Griesinger, for the sake of a crude theory, would destroy the means that has brought him so far into the light. And what will he substitute for our asylums? As we have said, his city hospital for the insane is scarcely distinct from the Berlin Charite. Every one who has longed for an improvement in the unfortunate system at Berlin, and has felt the hope, can now rejoice that his propositions have not been generally carried into effect. But that, at a time when the smallest state is endeavoring to establish these charities on a proper basis, the great German capital should be thus remiss is some-

thing that touches the pride of every German that feels for his country."

We suppose that Dr. Roller's conservatism in this point is not universally shared by his countrymen, at least in the extension of mental disorders beyond the usual domains of neuro-pathology, but we like it, nevertheless. As he says, our knowledge of insanity is not by any means exhausted, and that the general acceptance of the proposition that it is simply a somatic disorder of the nervous system would lead to erroneous results. One confounds by such a statement the anatomy and physiology of the brain with psychiatry.

This conservatism appears elsewhere through Dr. Roller's book. Not only is the distinction of insanity from nervous disease maintained in other parts of the book, but in respect to hospital organization, construction, and details, the author holds in great measure to the time-honored views that have prevailed generally in these matters. He is in the main an advocate of the usual form of asylum as distinguished from the cottage or pavilion system, and the plan adopted at Gheel in Belgium, and in one or two places in Scotland. He admits that there are some advantages in these systems, but combats their general applicability. He gives the preference to the vertical rather than to the horizontal plan of dividing the wards; that is, he prefers to have the separate departments in different stories of the same building, rather than in lateral extensions, a plan which is, we think, not the one generally favored in the construction of American hospitals.

We cannot analyze the sections of the book *seriatim;* its details are too numerous, and the discussion of many of the subjects hardly brings out anything very new or valuable to physicians in this country. The points touched on are generally practical ones, and they are treated in a plain, sensible way, and it is in the practical and sensible views of the subject that American physicians are usually strong. There are, however, some things yet unmentioned in the book that are worthy of notice as coming from a German author, to which we can still give a brief notice. For example, we suppose the influence of the *Zeitgeist* in Germany, and especially among scientific men in that country, is scarcely in favor of any very decided religious bias in psychological or biological views. We cannot, from the evidence before us, prove that our author possesses any extreme predilections in this direction, but he is quite emphatic in his testimony as to the value of the religious element in the treatment of the insane. He not only gives his own opinion, but supports himself by the testimony of others, quoting at length from the writings of Falret and Jacobi in support of his views. After a lengthy extract from the latter author, he adds his own comments as follows, in a paragraph which will also indicate, perhaps, better than those we have already quoted, the stand-point he takes in regard to the vexed question of the true nature of insanity: "At

a time when every view of the subject before us, except a purely somatic one, is incontinently denounced; when every investigation in this field other than that of the structure and function of the nervous system, is scouted as a most fruitless speculation; and when it is declared a very dubious metaphysical digression if one takes into consideration the totality rather than a mere fraction of the nature of man, in such a time it seems eminently proper to call attention to the opinions as to the supra-sensual part of our nature, of a man who was one of the first among alienists to demonstrate in a scientific manner the somatic nature of mental disease, and who took no one-sided view in the matters of religion, but who was, according to the testimony of his worthy associate, Dr. Willing, 'free from all partisanship and alike charitable to all without regard to creed.'"

The sections which contain the discussion concerning the public relations of the insane, the general management of asylums and their inspection, the study of psychiatry, and the questions in regard to insanity and the civil and criminal law, are worthy of attention, but we can only give them this passing mention here.

The last two sections of the book relate to the questions of the prophylaxis of this class of disorders, a subject which deeply concerns society, and which, as yet, has hardly received recognition as in any way appertaining to public medicine. In the first of these two sections, the author briefly goes over the causes of insanity, and here again he shows his anti-materialistic and conservative bias, in that he lays a part, at least, of the greater activity of the causes of the disease at the present time, among other things to the extension of the skeptical and irreverent spirit throughout society.

The last section is given to the subject of intemperance, and the means of combating its spread. The subject is not a new one in this country, but it is of interest to see it taken up so earnestly by a German author. He is certainly sufficiently emphatic in his expression of opinion as to the evil of intemperance. He reproaches his countrymen with their lack of earnestness in this reform, and pays a deserved tribute to those French investigators who have done so much recently to give the temperance arguments a truly scientific basis.

There are many other features in Dr. Roller's book that are worthy of attention, but we cannot notice them here, and will pass on to the other works whose titles head this chapter. We will only say, in taking leave of it, that it conveys to us a very favorable impression of the author as a philanthropic worker in this very important department of medicine.

The next work on our list, the pamphlet of Dr. Samt, is of a different character from the one just noticed. It comprises two lectures delivered before the Berlin Medico-Psychological Association, on the question of the method of study of mental disorders. The author belongs to the more purely physiological school of psychologists, the class of which Wundt, of Heidelberg,

is one of the principal German leaders, the advocates of the doctrine of what they denominate the "psychical unconsciousness," and the automatism of human actions. The argument for this way of viewing the subject is clearly and readably given in the first of the two addresses. It is our intention in a future number of this journal to devote some space to the discussion of this and similar physiological and psychological views, as set forth in other larger and more pretentious works, such as *Wundt's Psychology*, and others, and we will therefore not enter into the subject as it is presented here. Its consideration requires more time and space than we can give at present, even in its special application to mental pathological conditions.

The second lecture takes up at once the special forms of insanity. Dr. Samt announces himself, at the commencement, an upholder of the absolute non-identity of the various kinds of insanity; that they are distinct diseases and not, as has been supposed, only phases or varieties of one common type. Mania, he says, for example, is as typical and primary a disease as croupous pneumonia or typhoid fever, and the whole address is given to the description and discussion of this and another typical form, of that asthenic lunacy, with hallucinations, etc., which Sander, Leidesdorf, and other German authors have described as a distinct variety of insanity, under the name "Verruecktheit." This, in the opinion of Dr. Samt, is a *morbus sui generis*, or rather a clinical group in which several varieties are distinguishable. The greater part of the chapter is taken up with the history of the development and symptoms of these two forms, which serve as typical examples to illustrate the author's theory of the independence of these diseases. He says, "How different from both of these are epileptic and hysterical insanity, the insanity of puberty and old age, and many forms of alcoholic and even puerperal insanity. I do not say that epileptics or those under the influence of alcoholism, youths, etc., always have the same form with its special development and symptoms; a puerperal woman much more frequently has an ordinary form of mania or melancholia; a hysterical person can become a common lunatic. I only intend to say that in my opinion there are determinate forms of insanity that are only seen in epileptics, varieties that occur only in puberty, the puerperal condition, etc. How different from all are general paralysis, the delirium in the so-called organic brain diseases, in fever or after febrile affections, be they brief or protracted."

The author lays great stress on the family history in studying the cases of insanity, and this can be only satisfactorily learned in private practice. He says "ten well-observed families in which different forms of mental disorder are seen, will be more instructive ætiologically than the asylum statistics of thousands of cases." The lecture closes with a couple of paragraphs in regard to the limits of our knowledge of the relations of mental disease to physical alterations in the nervous system, a very judicious and

well-timed confession of our ignorance of all the obscurer processes underlying the phenomena of what we call insanity. And in the light of this confession, it may be questioned whether the title Dr. Saint has chosen, "The Scientific Method," is appropriate, whether it does not conceal an assumption that it may, perhaps, be hard to justify.

Dr. Walther's pamphlet is, as its title indicates, a plea for open, voluntary asylums, or retreats, for the slightly deranged, or those suffering from what seem to be the incipient stages of mental disorder, but who are not yet to be considered as actually insane, and who therefore are not fit subjects for treatment in the usual hospitals or asylums. For such patients he holds that an attractive and well arranged institution, managed on the principle of institutions for merely physical ailments, but under the charge of a practical alienist physician, is in all respects the most desirable place of treatment.

Madame Rivet has, in her little book, endeavored to give the non-professional public of her country some insight into the subject of mental alienation and the internal management of asylums. The book deserves success for the spirit in which it is written ; it is the first contribution to literature of the author, an amiable woman who has struck out in a new line for her sex. The daughter of one of the most eminent of French alienists, she was herself early introduced into the responsibilities which attend the care of the insane, and in this little work she has given the souvenirs of a useful and busy life in this employment. It is of interest in a medical point of view as containing the observations of a sagacious woman whose opportunities have been among the best. Of the subjects she takes up we can only enumerate a few. After some preliminary remarks, she gives separate chapters to the questions whether the insane can be remanded to the care of their friends, of the influence of visits to them at the asylums, their childish and destructive habits, the time when insanity begins in young women, and many others of equal interest. She also discusses the various forms of insanity, the religious, political and hysterical types, and idiocy. Altogether, apart from the interest of its feminine authorship, this little book is one the reading of which will be profitable to every physician who has to do with the treatment and care of the insane.

IV.—THE SYMPATHETIC NERVOUS SYSTEM.*

I. Lecons sur l'Appareil Vaso-Moteur. (Physiologie et Pathologie.) Faites a la Faculte de Medicine de Paris. Par A. Vulpian, etc., etc. Redigees et Publiees par le Dr. H. C. Carville, etc. Tome Premier. Paris: 1875, p. 571. (*Lectures on the vaso-motor apparatus, etc.*)

II. Lecons sur les Nerfs Vaso-Moteurs, sur l'Epilepsie, et sur les actions Reflexes Normales et Morbides. Par le Dr. Brown-Sequard. Traduites de l'Anglais par le Dr. Beni-Barde. Paris: 1872, p. 211. (*Lectures on the vaso-motor nerves, etc.*)

III. Des Nerfs Vaso-Moteurs. These pour le Concours d'agregation (Anatomie et Physiologie), par le Dr. Charles Legros. Paris: 1873, p. 111. (*The vaso-motor nerves.*)

IV. Lezioni di Fisiologia Sperimentale sul Sistema Nervoso Encefalico. Date. Dal. Prof. Maurizio Schiff. Nel R. Museo de Firenze, l'Anno, 1864–65. E. Compilate per cura del Prof. Pietro Marchi. Seconda Edizione, Rivista ed Augmentata. Firenze: 1873, p. 548. (*Lectures on the experimental physiology of the central nervous system, etc.*)

V. Kritische und Experimentelle Untersuchung des Nerveneinfluss auf die Erweiterung und Verengerung der Blutgefæsse. Preisschrift von Gustav Rœver. Rostock: 1869, seite 118, zwei Tafeln. (*Critical and experimental investigation on the influence of the nervous system on the dilatation and contraction of the blood-vessels, etc.*)

VI. Sull' Anatomia Patologia del Gran Simpatico. Pio Foa. (Rivista Clinica de Bologna. Fasc, 7–8–9, 1874.) (*On the pathological anatomy of the great sympathetic, etc.*)

VII. Beitræge zur Histiologie u. Path. Anatomie des Sympathischen Nervensystems. Von Dr. Alexis Lubimoff aus Moskau. *Virchow's Archiv. f. Path. Anat. u. Klin. Med.* Band 61. Heft 2, s. 145. (*Treatise on the path. anatomy of the sympathetic nervous system, etc.*)

VIII. On the Functions of the Sympathetic System of Nerves, as a Physiological Basis for a Rational System of Therapeutics. By Edward Meryon, M. D., etc. London: 1872, p. 68.

The action of the atropine can hardly be on the nervous centres alone, from whence the secretory nerves proceed, for when the chorda tympani is divided, and its peripheral end is irritated, the vaso-motor nerves act, though the secretory do not, and yet they are both alike cut off from the centre. It is hardly probable that

* Continued from page 77.

the atropine acts on the fibres of the secretory nerve, for, in that event, it is difficult to see why it should not have acted on the vaso-motor nerve fibres as well, that have their course in the same trunk. If this is so, how does it happen that irritation of the secretory nerves does not increase the action of the gland, when the same kind and degree of irritation is known to increase it in the absence of the atropine poisoning? Does the atropine act on the secret ry cell so as to embarrass or prevent its action, although the nervous force continues to reach it through the medium of the secretory nerves? Or is it a case to be compared to the one we have just noticed in detail, in respect to the action of woorara, paralyzing muscular action as excited through the motor nerves? In that case the point of action was decided by Professor Vulpian himself to be at the place of contact of the peripheral end of the motor nerve fibre (endplatten) and the muscular fibre.

It may be either way. But it must be in one of these, in part at least, that the atropine works in preventing the action of the secretory cells of the submaxillary gland. So far as we know, there can be nothing lacking in the anatomical relations of the nerve fibres and secreting cells. The atropine, it seems probable in such a case, has exerted a paralyzing influence either on the cell or on the nerve fibre at the point of contact, between it and the cell.

This view of course supposes that the secretory nerves of the gland exert a direct influence on them—altogether comparable to that which is exerted by a motor nerve on the muscular fibre, in contact with which it is placed at its peripheral end. And this intimacy of relation has been established, as between the secreting nerve fibres and the nuclei of the gland cells, by Kuehne and others. Now the same closeness of relation, between the peripheral ends of the nerve fibres, on the one hand, and the muscular fibres and secretory cells on the other, we believe to hold true also as to the relations between the ultimate anatomical elements of other tissues and parts of the body, and the nerves distributed to them.

In the same way as the secretory nerve-fibres of the chorda tympani may be made to influence the rate of action of the cells to which they are distributed, so in like manner may muscle be made to act, or the *rate*, if not the *kind* of nutritive action of various parts of the body, be changed through the medium of the nerves that are distributed to them.

By irritating the secretory nerve under normal relations, the cells are excited to unusual action. This increased secretory action cannot go on without a corresponding increased blood supply. How is this latter obtained? It may be possibly done in one of three ways: 1. By a simultaneous excitation of the vaso-dilator, with the secretory nerves. 2. By irritation of the secretory structure through the medium of its nerves, and, as a final result, *attracting* more blood into the part, by the so-called

vis a fronte action, or, 3. By reason of this same irritative action provoked in the gland by its nerves, an effect is produced on certain sensory nerve-fibres distributed to the gland-cell structure, which nerve-fibres conduct directly or indirectly, the influence aroused in them, to the local nervous apparatus of the vessels of the gland, and in such way as to arrest in a certain measure their *tonic* action on the vessels to which they belong. Under these circumstances the vessels dilate on account of the expansive pressure of the contained blood, and so admit more blood to the gland than before, and in a measure suited to the degree of the irritative action in existence in the secreting structure, and by action perfectly similar to this do we believe at present, all active idiopathic congestions to arise. There is first of all, irritative nutritive action, excited in a part through the medium of its nerves, and this local irritative action involves, in the way already described, the local vaso-motor nervous apparatus so as to lead to the observed congestion. Hence it was said above, that the due consideration of this case of the action of the atropia, on the secreting structure of the salivary glands, involves in one way or other the "whole question as to the share the nervous system has in the production of active congestion, etc." We have dwelt on this point because it has seemed to us an important one, and because the author has not seemed to give it the attention it deserves.

M. Vulpian now passes to a consideration of the action of the centres, on the more strictly peripheral vaso-motor nervous apparatus. This leads of course to a discussion of the anatomical connections between the two. Beginning with the original observations of Waller, he reviews the later investigations of Courvoisier, Schiff, Giannuzzi and others, concerning the point as to whether the fibres of the *rami communicantes* and the vaso-motor fibres of the spinal nerves pass from the sympathetic toward the cord, or *vice versa.*

They pass in both directions, especially the latter. This is especially true of the anterior or motor roots of the spinal nerves. The fibres going toward the cord are found chiefly in the *rami communicantes.* Some attempt is made in this connection to fix upon the particular spinal nerves which the centrifugal vaso-motor nerves of the special regions of the body accompany. We have no space at present in which to give the results of the examination, but he joins M. Cyon in the declaration that it is highly desirable to ascertain what parts of the cord give origin to the vaso-motor nerves of limited parts of the body.

Next M. Vulpian takes up the question as to the existence of vaso-motor centres in the spinal cord.

This question, as the readers of our last volume will remember, was pretty fully discussed in various articles contained therein. We will not again, therefore, in this place, give a history of opinions and researches on this subject, especially since the work of M. Vulpian does not carry the subject farther than

it was in that place. The conclusion reached is, that the spinal cord in its whole length, exercises an influence on the vaso-motor nervous system entirely up to the summit of the medulla oblongata, and moreover, that the hemispheres themselves have an influence on the circulation of the opposite side of the body. Then follows a consideration of the effects produced by irritation or stimulation of the spinal cord in various parts of its length. The observations of Budge and Waller, of Brown-Sequard, Bezold, Ludwig and Thiry, Kessel and Stricker, Soboroff, Afonasiew and others are cited, which show that such action on the cord leads to contraction of the vessels of corresponding parts.

The effects are next considered of various pathological lesions of the cord on the circulation of parts of the body, and also various reflex vaso-motor actions that have, however, been rather fully considered in former numbers of the JOURNAL.

The singular fact is noticed that if a sensory nerve—say the sciatic—is painfully irritated, it leads in a reflex way to contractions of the muscular arteries of the body, with the exception of those of certain limited regions, especially those of the ear of the same side as that on which the irritation is practiced. But Prof. Vulpian declines any attempt at an explanation. Also other vaso-dilator phenomena and the nervous mechanism through which the dilatation is accomplished, are considered in a highly instructive way.

To return to the subject of the vasor-motor centres in the spinal cord and medulla oblongata. He reviews the opinions and researches of Schiff, Owsjannikow, and others as to the existence of a supreme vaso-motor centre for the whole vascular system. He then proceeds to detail a number of experiments of his own, from which he concludes no such centre exists in the sense apparently claimed, as he says, by most German experimenters, viz.: that the vaso-motor centripetal fibres all pass to the cord, and, without terminating in it, mount up to the medulla, where they plunge into a vaso-motor centre for the whole body. If this is the view of the German experimenters referred to, we would certainly agree with Prof. Vulpian. We believe with our author that there is a line of vaso-motor centres in the whole extent of the cord, from its lower end up to the medulla oblongata. But we do not so understand, especially later observers of the Leipsic laboratory, such as Kronecker, Dittmar and others. They seem to us to admit the existence of the spinal vaso-motor centres, contended for by Prof. Vulpian, but as in the case of the ordinary motor tracts of the cord which culminate in the ganglionic masses in the base of the brain, or even the cerebral cortex, so for the vaso-motor tract in the cord. It culminates in a chief centre, in the floor of the fourth ventricle, from whence alone the whole vascular system may be commanded. The vaso-motor centres for special regions of the body are not in this general centre any more than the special motor apparatus for each group of voluntary muscles is to be found in the corpus striatum.

But just as truly as there is a chief centre for voluntary motion in the base of the brain, just so truly does there appear to be a chief vaso-motor centre, in which the vaso-motor tract of the cord culminates.

This, however, does not seem to be the view of Prof. Vulpian. In so far as he combats the idea just expressed, in so far do we believe him to be erroneous. From the citations made he had evidently not seen, at the time of writing, the more recent papers of Dittmar, Kronecker, and others, offering essentially the same views as those we have just expressed.

Next in order the question is discussed, whether the sympathetic ganglia are the centres for reflex action. Many interesting proofs are given that they are the seats of such action. It seems a little strange to us that any reasonable doubt could ever have existed on this point, in view of the fact that they are so largely composed of nerve cells, and in view of what we know, or can reasonably infer, as to their functions. We have no doubt but that every ganglion cell is the seat of such action.

M. Vulpian introduces into this section of his work a brief discussion as to the changes of color that can be produced, say in the skin of the frog, by operating on the sympathetic nervous system of such animals. The researches of Hering, Goltz, and of those of his own, touching this subject, are recounted, and the changes in tint are stated to be due to changes in form of the contractile pigment cells, to which the skin owes its color. They change their form, and hence their optical properties, under influences coming from the nervous system. Since the statements of M. Vulpian were written, other and more extensive researches have been conducted by M. Pouchet on the same subject, and, on the whole, with confirmatory results.

Our author now comes to the important subject of *vascular tonus.* From whence does the influence proceed that maintains the muscular vessels in a state of apparently continuous contraction? Doubtless, as M. Vulpian says, it comes from the vaso-motor nervous system, and, if so, this nervous system must be in a state of permanent activity. Now from what part of this nervous system does the steady tide of influence come, and what is it that so constantly stimulates it to action?

Doubtless the stimulus to the vaso-motor nervous system is the blood itself, on account of the impression it makes on the lining membrane of the vascular system, which impression is conveyed by certain nerves to the centres (tonic) of the vaso-motor nervous system, which, in a reflex way, excites the muscular coats of the vessels so that they contract, and hence the *tonus.* But what ganglia of the vaso-motor system are the real seats of this action—the small peripheral, or the larger sympathetic, or the vaso-motor centres in the cord and medulla?

The views of M. Vulpian on this point are not expressed clearly in the body of the work, but they are in a passage in the preface as follows :

"The vaso-constrictors are in a state of permanent activity. The vessels are therefore in a half contracted state, which constitutes what we call *vascular tonus.* This tonus diminishes and the vessels dilate when we divide their vaso-constrictor nerves. These nerves owe, consequently, their state of tonic activity to an excitation, which comes from the vaso-motor nervous centres. These are the centres which are indeed in a state of continuous functional activity and which maintain the vascular tonus. The ganglia situated on the course of the vaso-constrictor nerves appear to play an important part under this relation. For it is supposable that the vaso-dilator nerves terminate in these ganglia, and that they may, when excited to action by reason of either direct or reflex excitation, modify in some way the molecular state of the cells of these ganglia so as to cause the activity maintained by these cells in the vaso-constrictor fibres to cease altogether. Hence there is, necessarily, a suspension of vascular tonus and a paralytic dilatation of the vessels. Such is the hypothesis I have developed in my lectures, etc." (p. 7.)

This view, hypothetical as it may be, is probably not far from the truth. It agrees in all essential respects with that we have set forth in this journal, in the April and October numbers, 1874, in speaking on the pathology of the vaso-motor nervous system. In considering the ways in which vascular tonus may be modified, M. Vulpian refers to the "depressor nerves" of Ludwig and Cyon as an important factor in the case. A history of the successive steps in the discovery of these nerves is given, beginning with certain observations of Magendie. But we have no space at this time for entering on it. MM. Ludwig and Cyon found, in short, a nerve proceeding from the lining membrane of the cavities of the heart, ascends toward the trunk of the pneumogastric, which it soon joins, and from which it can be only with difficulty distinguished. It is a sensory nerve. Irritation of its central end caused a rise in blood pressure, viz.: caused an increase in vascular tonus. The question now arose as to how this was accomplished. Undoubtedly it occurs in a reflex manner. But what is the nervous mechanism through which it occurs? It was at first supposed it might be that the influence conveyed to the medulla by the cardiac depressor nerves was reflected on the motor part of the vagus, and hence the slowing of the heart's action. But this could not be, for the same slowing of the heart's action and rise in blood pressure occurred if both vagus nerves were divided. Hence, it was concluded the heart must obtain a nervous supply from the spinal cord in a less direct way than that of the vagus. This was the opinion of Bezold as the result of his remarkable researches on the "Innervation of the heart." It is at this point that the peculiar work of Ludwig and Cyon comes in. They found that after all the cardiac nerves are cut, from whatever source, that there was still the same slowing of cardiac action and rise in blood pressure as before. It could not, therefore, be true that the reflex influence was ex-

pended on the heart. It was ascertained by these investigators that the rise in blood pressure was due to an increased vascular tonus, which was produced in a reflex way by an influence conveyed to the medulla by the depressor nerves, and from thence reflected through the vaso-motor tract of the medulla and cord, outward to the muscular vessels, so as in this way to increase their tonus, and hence to increase the blood pressure.

Such is a bare recital of the discovery of the interesting relations now known to exist between the heart and the muscular vessels, through the purlieus of the nervous system. These facts, and the practical inferences to be drawn from them, are presented in a most attractive manner by M. Vulpian. But at this time we have no space to devote to speaking of the practical deductions to be made from these discoveries of MM. Ludwig and Cyon.

(*To be continued.*)

V.—PEON: MELANCHOLIA.

De la Melancolie avec Delire. Par le Dr. Alfred Peon, Medecin en chef de l'Asile public l'Alienes de Cadillac (Gironde), etc. Memoire Couronne par l'Academie de Paris, en 1870. (*Melancholia with Insanity.*)

M. Peon has given in this work a monograph on melancholia based on the clinical observations of one hundred and eight cases, the results of which, carefully compared and digested, form the subject of his memoir. At the end there are given, in a lengthy appendix, the details of fourteen cases, illustrating the different phases of the disease and the author's thoroughness of observation.

Dr. Peon divides his work into nine chapters. Of these the first contains a historical sketch of the subject from the time of Hippocrates, Aretæus, Galen and the other earlier observers down to the more recent times, as it is described in the writings of Pinel, Esquirol and others. We will pass by this to consider the second chapter, in which the author fairly opens upon his subject. It is a short one, and concerns the definition, locality and frequency of the disorder. Of these, only the first and last will call our attention here.

Melancholia, the author of this book defines as a state of sadness and fear, with more or less apparent partial mental aberration of the same nature, and with not infrequently attacks of maniacal reaction of short duration. He prefers the designation given it by Moreau of Tours, "Melancolie avec Delire," which

he has taken for the title of his book, to that of *lypemania*, proposed by Esquirol, and which is by far the one most generally adopted by French writers. The special application in this country and England of the Latin word *melancholia*, does not seem practicable in France, hence this somewhat labored distinction of our author. As regards the frequency of the disease, he has found it the type one hundred and eight times in two hundred and eighty-five observations of insanity, or about thirty-six per cent. of the whole.

The third chapter is one of the most important as well as the most lengthy in the book. Its subject is the causes of insanity. These Dr. Peon divides into two classes, the predisposing and the efficient causes. First of all in the former of these two classes he places heredity ; and he gives an interesting analysis of the cases in which this cause could be traced in his one hundred and eight observations. In his one hundred and eight cases he found, besides seven cases of apoplexy and one of habitual drunkenness on the father's part, and one of epilepsy in an uncle, twenty-one histories of mental disorder, which he gives in tabulated form. An analysis of this table results as follows: 1. That the heredity on the female side is nearly double that on the male ; 2. That the direct heredity from the mother is six times as frequent as from the father ; 3. That the collateral heredity is, on the other hand, a little more frequent on the male side ; 4. That the collateral heredity is among brothers and sisters as 4 : 3 ; 5. That the cases of multiple heredity occur on the mother's side; and, 6. That similar heredity, i. e. direct inheritance of the same form of disease, occurred only three times in the twenty-one cases: once directly from the mother and twice collaterally, the disorder having existed in one case in a maternal aunt, and in another in a paternal uncle. These figures are significant as far as they go, and, taking into account the cases of apoplexy and drunkenness on the father's side, the resulting average shows that the maternal influence in the hereditary production of this form of mental disorder, is about one-half greater than that of the father.

Other causes that are considered as predisposing to this form of mental trouble, are religious and political excitement, peculiarities in education or the lack of it ; mental weakness, the social conditions, celibacy or widowhood, age, sex, temperament, various kinds of occupations and the seasons etc. All of these are discussed with care and the observations analyzed in regard to several of these points. The respective liability of the two sexes is stated as a rather complex question, and no very definite opinion is offered. Very interesting analyses of the occupation and the temperaments of the patients under observation are given, which, however, we cannot follow in detail. According to the statistics thus afforded, the so-called nervous temperament predominates in melancholics, and the bilious and sanguine-lymphatic are the rarest. Likewise in respect to occupation : the sedentary professions furnish 46 per cent. or nearly one-half of the cases, to 32

per cent. from the non-sedentary; the remainder being taken from the semi-sedentary occupations and the non-laboring portion of the population.

Taking up next the immediate causes, the author considers first those which he designates as moral: the excessive religious feeling, disappointed affection, excessive mental exertion, domestic troubles, etc. He attaches comparatively little importance, or at least less than is usually attributed to them, to the first three of these causes. On the fourth, however, together with the influence of early impressions, and of sudden changes in life, he lays some stress. The physical inciting causes enumerated are diseases of the brain, of the circulatory and digestive organs, phthisis, uterine diseases, severe febrile affections, and hysteria among the neuroses. Besides these we have, as occasional exciting causes of melancholia, as well as other forms of insanity, various moral causes, such as sudden frights, violent emotions of any kind, fear, the instinct of imitation excited by the association with others under the influence of the disorder, and certain accidental pathological states, such as menstrual disorders, insulation, etc.

The fourth chapter, some thirty-seven pages in length, is given to the subject of the symptoms, varieties, and cause of the disorder.

This chapter is worthy of a very careful review. Our space, however, will only allow us to notice briefly its most striking points. We cannot, indeed, do better, under the circumstances, than quote from the author's own summary of this and the succeeding chapters on diagnosis, terminations, etc. He says:

"Melancholia has ordinarily a longer or shorter prodromatic period, which is frequently only an exaggeration of the moral tendencies, of the melancholic, suspicious disposition of the patient. His fears and suspicions, well founded or imaginary, increase in number, and the patient after a struggle finally yields and loses his reason.

"Insanity comes on with a series of symptoms more or less constant and simultaneous. It is more or less fixed, sad in its nature, and only partial, but the order of ideas it embraces varies according to the case: they are usually concerned with honor, health, life, fortune, the fear of hell, and perdition, either for the patient himself or others in whom he is interested. These ideas may originate solely in the mind, and be mere insane fancies; but more commonly they are engendered by hallucinations of the senses and illusions.

"The hallucinations that are most frequent in melancholics are those of hearing; then come, in the order of their frequency, those of sight, of tact, of smell, and of taste.

"The hallucinations of hearing are sometimes double. They diminish with the acute stage and in dementia.

"The hallucinations of sight arise more or less suddenly, and vary according to the insane tendencies of the patient. In general, they are simple as regards the elements which compose

them; but in this sense they form tableaux, a phenomenon much rarer and less perfect in that of hearing.

"Hallucinations of tact are rather frequent in melancholics; those of taste and smell are less common and more difficult to appreciate.

"Melancholia is often complicated with tendencies to violence, homicide, suicide, incendiarism, depraved appetites, and refusal of food; I have found suicidal ideas in a fifth of the cases. We often see disturbances of the digestive functions, the cerebral circulation, and the sensibility; they are often augmented and sometimes perverted or diminished. The external manifestations are those of sadness and low spirits, sometimes of stupidity.

"Melancholia presents itself in many forms; the principal ones are: 1, Generalized melancholia; 2, Partial melancholic insanity, the first including simple melancholia, melancholia with anxiety, and melancholia with stupor; the second, hypochondriacal insanity, ideas of persecutions, the religious form, the ideas of greatness, the romantic or erotic types, etc.

"The progress of the disease is usually slow, as is generally the case in mental disorders. Acute melancholia is necessarily of short duration, since death soon takes place from exhaustion, if it is not anticipated by suicide. Subacute melancholia has a remittent or intermittent course. This last is composed of periods of depression and of excitation, separated or not by lucid intervals.

"The patients at first reject the insane ideas, then, vanquished by them, they accept them, eliminating some and adding others; they prepare replies to all objections; and, finally, the insanity becomes fixed, and, as it were, stereotyped.

"If the disease is sufficiently prolonged it terminates in confirmed dementia, preceded by a progressive mental depreciation. But before coming to this point it often undergoes various transformations. Ideas of grandeur, more or less pronounced, are added to the original insanity; the patients become princes and monarchs, saints and divinities. As the intelligence gradually disappears, the physiognomy loses its imprint of melancholy and agrees with the new insane notions of the patient.

"The diagnosis of melancholia is easy. It is based, first, on the information furnished by the family: the presumable cause. We must attach great importance to direct or indirect heredity, and take account of apoplectic tendencies, drunkenness, temperament, the moral characteristics of parents, and, still more, we must learn the antecedents and tendencies of the patient. Second, it is based on the direct examination of the patient, his external appearance, and the nature of his ideas. The suicidal, homicidal, or incendiary monomaniacs have about them something of instinctive and irresistible impulse, not seen in the similar tendencies that often complicate melancholia. Simple hypochondria differs from the hypochondriacal ideas of this disorder in that the latter are accompanied with a general melancholic disposition, a true intellectual or emotional insanity.

"The duration of the disease varies from a few days to many years. Recovery is rather frequent, but relapses are common; when death occurs it is generally from an accidental disease, or it is brought about by suicide or refusal of food. Dementia often precedes death.

"I have given attention to the prognosis of melancholia. It is always grave, and its gravity depends :

"1. *On the cause.*—It is evident that great importance is to be attached to the causes, their nature, intensity, duration, etc. As the cause or the predisposing causes are bad in their nature or intense and prolonged, the less intelligence will there be to resist them; the greater the combination of them causing the invasion, the worse will be the prognosis. Especially so when the element of heredity complicates the case, since then the individual has already the special tendencies which may be incited into insanity.

"2. *On the nature of the disease and its symptoms.*—The presence of suicidal tendencies which occurred in about one-fifth of the cases under my observation, the refusal of food, still more common, and sometimes kept up with an obstinacy that nothing can overcome, render the case dangerous; the hallucinatory state, without intermission or rest, and the anxious pre-occupations of the patient, are troublesome complications, since they allow him neither the time nor the force to react in a sense favorable to recovery.

"The more fixed and systematized the insanity the graver is the prognosis. Melancholia of the reasoning kind or that with a predominance of ideas of religion or of greatness is difficult to cure. The individuals who declare themselves saints or gods, princes or monarchs, rarely recover. The same is the case with those who conceive that their bodies have undergone transformations, or who have reptiles, eels, or leeches in their stomach, spiders in their head, etc.

"3. *On the cause of the disease.*—If, after the acute stage, in the period of remission, the hallucinations or illusions are seen to persist, as if by a kind of habit; if we observe certain phenomena reproducing themselves exactly the same with a great regularity, and with long intervals, as in the intermissions with alternating depression and excitation, we must form an unfavorable opinion, and a favorable one, on the other hand, if the periods of remission are short. Finally, we must apprehend dementia if there is a slow and progressive debasement of the intelligence and depraved instinctive acts not hitherto manifested.

* * * * * * * * *

"In the actual state of our knowledge melancholia does not appear to have distinct pathognomonic anatomical lesions.

"I take up, with hesitation, the question of the immediate cause: 1, The brain is only the instrument of thought; 2, We are ignorant of the connection between it and thought; 3, We can only conjecture the nature of that relation in health as well as in disease; 4, The lesion of the intelligence supposes the cere-

bral lesion; but we do not yet know the proper and essential lesion of melancholia, because we do not find a constant and always identical lesion at the autopsy.

"The element of sadness is produced by the intense and prolonged action of the cause on the part of the brain destined to receive affective impressions; this nervous tract reacts strongly on the organs of emotional expression.

"Moral treatment, well directed, ought to be of avail; but we can only meet the functional physical disorder, caused by or causing the malady, by physical means.

"Physical treatment ought not, therefore, to be neglected in melancholia, as it can be of great service to the physician who knows how to suitably employ it."

The above extract gives, we think, better than we could ourselves condense it, the substance of the book; so that the reader can appreciate its value.

Of the fourteen clinical histories of cases illustrating the different forms and types of melancholia contained in the appendix, the macroscopic observations in the autopsies of seven individuals are given; but, as might be expected, and as is stated by the author himself, nothing of very special value was observed. In all other respects, however, the observations are valuable as illustrating the author's studies and experience.

VI.—STEINER: CHILDREN'S DISEASES.

A Compendium of Children's Diseases. A Hand-Book for Practitioners and Students. By Johann Steiner, Prof. of the Diseases of Children in the University of Prague, etc. Translated from the second German edition by Lawson Tait, F. R. C. S. New York: D. Appleton & Co. 408 pp. 8vo. Chicago: Hadley Bros.

The use of compendiums or condensed manuals seems to be one of the inevitable attendants to the study of medicine. They are convenient and labor-saving institutions, and popular favor will probably never leave them. It is a matter of interest, therefore, that, while accepting the inevitable, we should as much as possible, strive to render them not an absolute evil but a suggestive aid; not supplanting, but supplementing the larger and fuller treatises on which the practical knowledge of the physician should be actually based. They should be books of ready reference, indicating and leading to the ampler stores of knowledge.

The work before us, while it gives evidence that the same tendencies exist, in a certain degree, even among the thorough-going

Germans, as in this country, yet compares favorably with any work of its kind that we have seen, and, indeed, comes nearer to fulfilling the requisites we have mentioned, than any others on its special subject.

It is certainly more scientific than any other we have seen, and, in some respects, more full and complete. We do not consider it any disadvantage that it lacks the long lists of formulæ or the very frequent prescriptions scattered through the text that we find in some other similar works. The remarks on treatment, however, without being less general, might well, in some cases, have been more full ; they are, perhaps, the one point in which the book is most deficient.

The diseases of the nervous system are considered in the first one hundred pages. This is, in some respects, the most valuable portion of the work ; it seems to be quite fully up to the present state of our knowledge in regard to this department; and the various forms of disease, their symptoms, causes etc., are treated quite as fully as could be expected in a condensed manual of its kind. Some diseases, however, which are more or less purely nervous, are described elsewhere in the book, such as spasm of the glottis and palsy of the larynx, among the diseases of the respiratory organs. Diphtheritic paralysis also receives a brief mention among the neuroses, and is more fully treated again in connection with diphtheria. We also find no mention of spasmodic asthma, although Politzer, and more recently Guastalla, among European authors, have described cases of this affection occurring in young children. Dr. Steiner evidently considers whooping-cough, to some degree at least, as a neurosis. He says it may be regarded as a "neurotic contagious bronchial catarrh." The neurotic character of many forms of skin disease is also recognized by the author.

The principal value of this, as distinguished from other similar works, is in the fact that it describes, not at length, but still with some measure of fullness, nearly every affection that is likely to occur in childhood, among them several not included in the ordinary text-books which have not been revised up to the most recent date. We do not think it as likely as some other books to do harm by encouraging a lazy and superficial habit of study. The student and the practitioner can both find it suggestive and useful.

The translator has done his part on the whole satisfactorily, and his annotations add to the value of the work. The only criticism we shall offer is in regard to his occasional introduction of words from the original that might, without too much trouble, we think, have found English substitutes. Such expressions for example as "symptom-complex," though perhaps used by some, are not yet found in the standard medical dictionaries, and are purely foreign terms. As we have said, however, the work is, in general, very well done, and we need not dwell on such minor points.

The publishers have produced the book in their usual handsome and convenient form, the paper, typography and binding being alike unexceptionable.

VII.—SHORTER NOTICES.

I. Spinal Paralysis in Children and Adults. By E. C. Seguin, M. D. (Reprinted from the Transactions of the N. Y. Academy of Medicine, for private circulation only.) New York: D. Appleton & Co., 1874. 57 pages.

II. Das Verhaeltniss der Nerven zu den willkuerlichen Muskeln der Wirbelthiere. Eine histologische untersuchung von Dr. J. Gerlach. Mit 4 Tafeln. Leipzig: 1874. 66 pages. (*The relation of the nerves to the voluntary muscles in vertebrates, etc.*)

III. Experimentation on Animals as a Means of Knowledge in Physiology, Pathology and Practical Medicine. By J. C. Dalton, M.D., Professor of Physiology in the College of Physicians and Surgeons. New York: 1875. F. W. Christern. 71 Pages.

IV. The Relations of the Nervous System to Diseases of the Skin. By L. Duncan Bulkley, A.M., M.D. (Reprinted from the *Archives of Electrology and Neurology*, Nov. 1874.) 30 Pages.

V. Ohio State Medical Society. Report on General Paralysis. By D. A. Morse, M.D., of London, O. Toledo: 1874. 120 Pages.

VI. Chicago Relief and Aid Society. Report of the Committee on Sick, Hospital, and Sanitary Measures. (From the General Report of the Society.) 1874. 63 Pages.

VII. A Consideration of Certain Symptoms Associated with Morbid Changes in the Medulla Oblongata. By Allan McLane Hamilton, M.D. (From the Transactions of the New York Academy of Medicine for January, 1875.) New York: 1875. D. Appleton & Co. 15 Pages.

VIII. Physician's Office Case Record and Prescription Blank Book. Third Edition. Cincinnati: Case Record Company, 1875.

I. This handsomely-printed paper, by Dr. Seguin, deals with a very important and comparatively rare affection, in the adult. The author cites the various forms under which it has been

described by Duchenne, Charcot, Meyer, Gombault, Petitfils, Bernhardt, and others. The history of the affection, as described by various writers, from what is claimed to have been its first mention—by Duchenne in 1847—down to the present, is given. Brief histories of twenty-two cases are given, only five of which occurred in the experience of the author, and one of these (case XVII.) is the same as case X., cited from Dr. Hammond, the case having fallen into the hands of Dr. Seguin since having been seen by Dr. Hammond.

Then follows an analysis, clear and judicious, of the phenomena recounted in the histories of the twenty-one previous cases. Under the first head is included the symptoms. One of the most common symptoms is paralysis (paresis, akinesis). It appeared in all the cases cited, but was seldom complete. Among disorders of sensibility, chiefly confined to the extremities, dysæsthesias were far the most common. Anæsthesias and hyperæsthesias, in a marked degree seldom present. Among disorders of nutrition, atrophy of the muscles, as is well known, is the principal phenomenon. We cannot, at this time, follow the author in his remarks on differential diagnosis. They are instructive, though not novel.

The author would place the anatomical seat of the disease in the anterior horns of gray matter in the spinal cord, and would designate the morbid structural change as *granular degeneration of the ganglion-cells* of the anterior horns. Dr. Seguin had evidently, at the time of writing, not seen the work of Friedreich, of Heidelberg, in which a different view would seem to be taken of such cases as are given in this paper, and in which cases are cited that do not conform to the type laid down by our author. The prognosis as drawn by the author from a study of the cases in his list, is hopeful. He concludes, from his examination, that the form of disease now under consideration "is very similar to the infantile spinal paralysis of children in its symptomatology and pathological anatomy, in its ætiology and progress."

Then follows a clinical lecture by the author, delivered at the College of Physicians and Surgeons, New York, on "Infantile Spinal Paralysis." We would refer all such as are in search of information on this interesting subject, to this clear and instructive lecture of Dr. Seguin.

II. Gerlach has been able, by the chloride of gold method, to follow the extensions of the nerve fibres within the sarcolemma of the muscles, the so-called intra-vaginal network, for a considerable distance in amphibians and other vertebrates alike, and to prove that this network is fundamentally the same in all. Another appearance, demonstrable by the same method, was that of a sprinkling of dark points which, by the action of the coloring agent, took on the same shade as the nerve fibres themselves. These dark points appeared by estimate to occupy about one-fourth part of the fibre under observation, and were utterly unre-

solvable under the highest powers. The remaining three-fourths of the contractile substance either remained uncolored or took on a lighter tint under the process. By still further treatment with a solution of cyanide of potash, a direct connection was shown between these points and the nerve fibres.

From this apparently so direct connection of the nerve fibre with the muscular contractile substance, and the lack of special terminal organs, Gerlach favors the conclusion first offered by Kleinenberg, that the muscles themselves are to be considered as the terminal expansions of the motor fibres. The irritation being propagated centripetally in the sensory fibres, the comparison, as regards the points made in this paper, would have to be made with their central terminations in the cord. The paper is certainly a very interesting and suggestive one.

III. Dr. Dalton's little book on vivisection sets forth in a very convincing way the utility and necessity of this means in advancing scientific medicine. He divides it into five chapters; the first refutes the charge of cruelty made against experimenters; the second shows the necessity of such methods when we wish to investigate the phenomena of life and disease, and the third deals with the results. This last might, we think, have been more complete. It is hardly equal to the statement to the same effect given in a recent number of the *British Medical Journal*, and largely copied in this country. No short statement, however, can contain more than a mere fraction of the results of these methods to the advance of practical medicine. We only wish that the argument in their support, from so eminent an authority as Dr. Dalton, had been more complete.

The two remaining chapters contain the resolutions of various medical societies, and the testimonies of distinguished authorities as to the value of experimental researches on living animals. These are certainly out-spoken enough, and we hope the common sense of the agitators of this question, in this country and Great Britain, will find its way to a distinction between the real necessity for and the alleged abuses of vivisection.

IV. The object of this paper is to show the intimacy of connection of the cutaneous nerves with the histological elements of the true skin, and to enumerate the "physiological considerations pointing to nerve origin of certain skin diseases: (*a*) normal (*b*), experimental;" and "pathological observations showing the same of four kinds: (*a*) eruptions directly consequent upon peripheral wounds of nerves; (*b*) eruptions attending lesions of conducting nerves; (*c*) eruptions accompanying brain and spinal disease; (*d*) idiopathic nerve lesions, found *post-mortem*, in nerves supplying the skin, etc."

The paper exhibits much literary industry, and is instructive. Of course the chief question relates to nervous trophic action, of which so many clinical examples accompanying local nervous affections have been recorded the past few years. On page 5 of

the paper we find a reference to a lecture published in the October number of this journal for 1874. Dr. Bulkley says: "Much, if not all, of the nerve influence in skin diseases has been often supposed to depend simply upon capillary changes induced by vasomotor nerve action, or want of action, viz.: hyperæmia and anæmia," etc. As an instance of this mode of viewing the subject, the author of the paper refers to the lecture by the writer of this notice published in this journal as above cited. We only refer to the matter for the purpose of saying that we hope the author of the paper we are noticing has succeeded better in representing the real meaning of the other writers quoted than has been done in the present case. Most certainly we never entertained such views, and have never given expression to them, neither in the place cited by Dr. Bulkley, as can be seen by careful reading, nor in any other writing.

V. This elaborate paper displays much industry and enthusiasm on the part of its author. It reviews pretty fully the literature, mostly foreign, concerning the symptomatic history, diagnosis and pathology of General Paralysis of the Insane. The author himself communicates no new observations in relation to the subject. The occasion of this study of the author was that of being called upon in the capacity of a medical expert in a case (John S. Blackburn) of trial for murder, and in which the plea of insanity was set up.

The bulk of the paper is a review of the "authorities" for the purpose of bringing them to bear on the case. There is nothing novel in the case as it is presented, having the interest simply that attaches to such cases. There are no new facts, or striking considerations drawn from old facts. But the paper will be of great use to those who are called on in similar cases, as indicating pretty fully the teachings of the leading authorities bearing on the subject. Most heartily do we commend the industry of the author.

VI. The Report of the Committee of the Chicago Relief and Aid Society presents a very interesting mass of statistics, very carefully and systematically compiled. The peculiar circumstances of the work of the committee gave them an opportunity such as is seldom afforded of applying to a very large class of the population at their homes the methods of record, etc., that have heretofore been only applicable in military or hospital and dispensary practice. As such the report will be appreciated by all medical statisticians.

VII. This is a very readable and to a certain extent suggestive paper on affections of the medulla oblongata. In a brief and inadequate notice, such as this must be, we cannot enter on a full consideration of the points made by the author. They are devoid of novelty, though possessed of interest. He draws an inference

from the "rapping experiment" (Klopfversuch) of Goltz that is hardly justifiable.

But we must confess that our space and time will not permit us to notice this paper as it deserves.

VIII. We have received specimens of these books from the publishers, and for the purpose for which they are designed, appear to be all that could be desired.

Beginning with the right hand edge of the book when open, we have first, a prescription blank, next, toward the left, a blank for a copy of the prescription, and to the extreme left, a printed blank to enable the physician to record the condition of the patient.

If some such form as this could be generally used by physicians, we are persuaded much good would result from such careful, systematic records of professional experience as are now thrown away. We would certainly recommend this record as simple, and all that could be looked for in such narrow limits.

Editorial Department.

IT has not been long since the name of Mr. Darwin was proposed, as that of a foreign member of the French Academy of Sciences. His claims were warmly supported by his friends, especially by M. Quatrefages, but to the surprise of almost every one, he was rejected.

The leader, M. Blanchard, of the opposition to his election, summed up their objections substantially as follows: "Mr. Darwin presents us an instance of an eminent scientific man of the widest influence, who has sacrificed scientific truth to mere reason, and reason to imagination; in short, he has unduly replaced scientific observation by mere hypothesis." In so far as these charges were true, his example was deemed pernicious to the best interests of science, and hence the reason of his rejection. But it is not to the justice or injustice of the action of the French Academy that we desire specially to call the attention of the reader. It is rather to the *reason* given for its action in the premises, and to the spirit which dictated it, and that to-day largely animates scientific research, that we would direct attention in this place.

This spirit is one scientific *realism* which has—so it seems to us — lost, in some measure, its balance, as between the domains of *Fact* and of *Inference*. It is characteristic of it to place an inordinate value on mere facts, as compared with the inferences that may be drawn from them, or on the consideration of facts *per se* as opposed to a consideration of their relations. It is shown in the favor with which the discoverer of a new fact (however insignificant) is regarded by many, as compared with the one who simply discovers new relations between, or new interpretations of, acquired facts.

There seems to be in many quarters a real unwillingness to admit any one to the rank of a scientific man, unless he has described some new stone, or bug, or plant, or compound, no

matter what his merits as a reflective thinker, or as an organizer of facts already in existence. And in making this statement, we do not overlook cases like those of Mr. Spencer, whose generalizing spirit and work have been hailed with so much applause. The first question asked usually is, "What new fact has he discovered, or what experiments has he performed?" If, unfortunately, the chief merit of the person in question should lie in his reflective rather than in his observing powers, his place is too often unhesitatingly assigned him without the sacred inclosure, to which but few are admitted who cannot exhibit a passport in the shape of some new fact—*physical* fact.

And this spirit is to be heartily commended and fostered, so long as it occupies its appropriate field. But, important as the discovery and mere classification of new facts may be, it is not the sole work to be done. It is not the highest work to be done. Facts, when they are once made known, must be analyzed, and reflected on, and, under a gaze at once minute and comprehensive, must be generalized.

To be a good worker in the mine does not, by any means, carry with it excellence as a worker in the mint; and so in regard to scientific workers. They may be divided into three classes: 1. Those endowed with good *observing* faculties, and who succeed in original research after new facts. 2. Those who have, comparatively speaking, good *reflective* and *generalizing* faculties, and who can and do take up the materials largely furnished by the first class, and study their relations. 3. Those who possess both classes of faculties in a well-developed state. The first class is happily a very large one. The second is a very small one as compared with the first, while the third is the least of all. One can almost count up on their fingers those who have excelled in both respects mentioned, and have thus been above reproach. Among them we may mention a very few such names, as those of Cuvier and Bichat, —epoch-making men, respectable not only in the sphere of the original observer, but also in that of the organizer, in the highest sense of the word.

What we would object to, as things are at present, is the undue estimate that is undoubtedly placed on the work of the

class first named, and the unfair claims at times made in its behalf, and the exclusive, arrogant spirit with which its pretensions are sometimes set forth. No one must expect a hearing when he opens his mouth in the direction of criticism, or deductions from existing data, unless he has himself publicly contributed some new fact to the common stock of information. If he has not, he must, from sheer incapacity, hold his peace. We do not say it is the common rule to meet with exhibitions of this spirit, but we do mean to say it is abroad and deserves rebuke for its unwarrantable assumptions. To illustrate this point, we will quote a paragraph from the preface to the *Lecons sur l' Appareil Vaso-moteur* of Prof. Vulpian, reviewed in the present and the preceding numbers of this journal.

In speaking of the ill-regulated and thoughtless haste with which many take up new discoveries in physiology to apply them in the domains of therapeutics and pathology, he says: "For my own part, I have always battled against this deplorable tendency to apply prematurely to pathology the still uncertain discoveries of experimental physiology. The majority of the views thus arrived at are wholly devoid of critical spirit, and are, moreover, wholly devoid of proofs. They are mere conceptions of the chamber, which each one can imagine for himself at his pleasure. And it would be easy to prove, for example, that the vaso-motor actions, attributed to this or that medicament, or to this or that poison, by *physicians* who have never made a single veritable experiment themselves, are often contrary to those revealed to us by physiology" (p. 11).

Now if the above expressions are intended as a condemnation of the crude applications, by ignorant and incompetent members of the profession, of physiological discoveries, the real import of which they do not and cannot intelligently comprehend; or the hasty deductions made by the clinicist, for practical purposes, from the same discoveries, which deductions are so frequently destined to be thrown aside with the same want of rational insight that marked their adoption, we would agree with him most heartily. But if they are to be so construed as to prevent the intelligent and thoughtful man of practical affairs in the profession from taking up physiological data, and by the light—too often uncertain—they afford, seek-

ing to explain the phenomena he observes in his extended intercourse with the sick, then we object. And this seems to have been in part, from the context, what Professor Vulpian intended. What exclusive capacity is it that a man has conferred on him, because he has performed a few, or even many, experiments, which enables him to do what other educated and sensible men may not do, in the way of understanding and applying the truths they teach? None that we know of. If a physiologist should lay bare the spinal cord of a dog, and, having done so, should divide the posterior roots of a number of the spinal nerves, and should then discover that the animal had lost sensibility in the parts to which the nerves in question were distributed, what does the physiologist learn from this case that any really intelligent member of the profession may not learn from it, *without* performing it, when it is once clearly stated to him? Nothing whatever. The latter may comprehend it as clearly as the other. And so for any other experiments. Then why may not the one man as well as the other, by reflecting on the truth that the experiment teaches, deduce from it conclusions as legitimately as the experimenter himself? In our judgment, he can do so. There is a deeper distinction to be made between mere *observing* and *thinking* than many seem to suppose. There is no marvelous virtue about an experiment, or an original sense perception, that can redeem any one from the mistakes and foibles to which all are liable, not even those who stand *ex professo* as experimentalists. Professor Vulpian himself, it is probable, is not any better able to deduce valuable inferential truth from his own admirable experiments than are many others who have never seen the inside of a physiological laboratory. All cannot become, in the full scientific sense of the word, "experimenters," and happily they need not be, but many can apprehend truth when it is clearly presented to them, and reflect on it fruitfully as well as the mere experimenter, and perchance better.

We would carefully guard against leading any one to suppose we undervalue the experimental method, or would contribute in any way to diminishing zeal in the observation of facts. We do not wish to see fewer experiments, but a more general prevalence of training in severe critical analysis, and

of close reflection in respect to the vast, and to a certain extent incoherent, masses of true and false facts that crowd alike the annals of scientific and practical medicine.

This is the most urgent need of to-day in medicine. And it is against what appears to be a lack of appreciation of this important need, that cannot be conferred simply by dexterity in the laboratory, and against the usurpations—the tendency to claim for the experimental method, as it is ordinarily understood, a wider sphere than legitimately belongs to it—that we would protest.

It is this comparative need of severe logical analysis, as well as of experimental criticism and research, that gives what little vitality it has to the opposition now made in certain quarters to vivisections.

We have received the announcement of a new journal entitled *Mind, a Quarterly Review of Scientific Psychology and Philosophy*, the first number of which is to be issued in London in October next. The field to be occupied is that of the scientific investigation of mind, a systematic and continuous record of progress in this department, and the publication of original researches and philosophical inquiries of the higher sort not so specially adapted to the pages of general magazines. All lines of investigation affording insight into mind, in dependence on the main track of psychological inquiry, will receive attention, and due prominence will be given to objective researches on the nervous system.

Perhaps a better idea of the scope of psychology as it is understood by the projectors of this journal than can be otherwise conveyed, is given in the following extract from their circular:

"Psychology holds a peculiar position within the general body of human knowledge. On the surface, not less distinct from biology than biology is distinct from chemistry, it is, in a deeper sense, opposed alike to biology and all the physical sciences, by reason of the unique character of its ultimate data —yielded from subjective consciousness—and yet, in one aspect, it stands in quite special relation with a part of biological science—the physiology of the nervous system."

As far as we know, no other periodical in the English language covers the ground which this one proposes to occupy. We trust that it will receive ample support. It is to be published by Williams & Norgate.

We have received the first number (Fascicoli, 1 & 2) of a new journal, the *Rivista Sperimentale di Frenatria e di Medicina Legale*, devoted to nervous and mental diseases, legal medicine and anthropology, and published in Reggio Emilia, Italy. Its chief editor is Prof. Carlo Livi, and among his collaborators we notice the names of Golgi, Pio Foa, Morselli, and others. The journal is issued six times a year. The first number contains original articles by Livi, Virgilio, Morselli, Tamburini, Golgi, and Lombroso, besides valuable analyses of recent memoirs on the histology, physiology and pathology of the nervous system, and others in the department of legal medicine. The *Gazetta Frenocomia di Reggio* is published as an appendix, and accompanies each number.

From the character of this first issue, we doubt not that this new journal will take at once high rank in the medical literature of its class.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

Functions of the Brain.—The *N. Y. Med. Journal* for March contains the report of a Committee of the N. Y. Society of Electrology and Neurology, consisting of Drs. J. C. Dalton, J. W. S. Arnold, G. M. Beard, A. Flint, Jr., and J. J. Mason, on the localization of motor centres in the brain. They experimented on dogs, following the method of Hitzig in using the continuous galvanic current. In general, also, the results corresponded very closely with those of Hitzig. The following are the principal points determined. The Committee say:

"There is no doubt that there are certain limited spots upon the surface of the cerebral convolutions which, when subjected, in the etherized animal, to a weak galvanic current, will cause distinct momentary contractions of separate muscles, or groups of muscles, on the opposite side of the body.

* * * * * * * * *

"In repeated instances, corresponding points upon the right and left sides of the brain act experimentally as centres of motion for similar groups of muscles on the right and left sides of the body. We cannot say that in all cases this bilateral correspondence of the cerebral centres of motion is complete; although it may be so in reality, since the two sides of the brain in the dog are never exactly symmetrical, as regards either the fissures or the convolutions.

"The action of the cerebral convolutions in producing muscular contraction, when this contraction is definite and limited, is always a crossed action: galvanization of the convolutions on either side of the brain exciting movements in the muscles, both of the limbs and face, on the opposite side of the body.

"Galvanization of the dura mater, or other sensitive parts, produces, on the contrary, by reflex action, muscular twitchings on the same side of the body. * * * * * * * * * * *

"If we compare the total results of all the experiments, the preponderance of crossed action in galvanization of the brain becomes very manifest. Fifteen different points of the cerebral surface, when galvanized, excited distinct movements on the opposite side of the body one hundred and sixty-nine times; two points excited slight movements on the same side with themselves four times only.

"Among these instances is not counted that of a special point which usually excited a flexion of the head and neck in the median line; both sets of muscles, right and left, being either called into action harmoniously, or

else each one having the power to flex the head without deviating it toward the opposite side.

"All the centres of motion for the anterior and posterior limbs are situated in the convolution immediately surrounding the frontal fissure. This fissure, which is well marked in the dog and other carnivorous animals, is a nearly transverse furrow running outward from the great longitudinal fissure, and situated at about the junction of the middle and anterior thirds of the brain, as viewed from above. The centres for flexion and extension of the anterior and posterior limbs, the Committee have always found in the external part of the præ-frontal convolution, just anterior to this fissure, and in the post-frontal convolution, just behind it. In a majority of cases, those for the anterior limbs were situated more in front, near the outer extremity of the frontal fissure, and those for the posterior limbs, more posteriorly and inward, but their exact position varied somewhat in different cases. The centre for flexion of the head and neck in the median line is in the lateral and anterior part of the præ-frontal convolution, where it bends downward and outward; that for the flexion of the head with rotation toward the side of the stimulus, is in a part of the convolution situated still farther toward the front, and downward, so as to be invisible in a view of the brain taken from above. The centre for the facial muscles is in a region situated in the lateral part of the hemisphere, immediately about the supra-Sylvian fissure."

The Committee also say:

"It is evident that a variety of circumstances influence the results of galvanizing the cerebral convolutions. On several occasions the contractions produced in an opposite limb seemed to increase in intensity with the repetition of the stimulus at short intervals. A deeply-etherized condition of the animal, on the other hand, will sometimes suspend altogether the phenomena of movement, which were so well marked a short time before; and these phenomena may re-appear after an interval of repose.

"A weak galvanic current from eight cells, applied to a particular spot may cause distinct movement in one of the opposite limbs only, while a stronger current, from sixteen cells, applied to the same spot, may produce a confused motion in all the limbs at once."

MM. Carville and Duret communicated to the Soc. de Biologie, Dec. 12 (reported in *Le Progr. Med.*), that in the autopsy of one of the dogs used in their experiments they found an old pathological lesion of the *centrum ovale* of the right hemisphere. There existed a large cavity, on account of which the convolutions of that side had completely lost their communications with the parts below. The *nucleus caudatus* of the corpus striatum and the internal capsule or foot of the peduncular expansion were intact. The nucleus had therefore preserved its relations with the peduncles, the protuberance, the medulla and the cord. The median commissure or vault of the corpus callosum was involved on the right side. They observed on the same side, also, an asymmetry of the peduncle and of the protuberance, and a very remarkable atrophy of the corresponding pyramid.

During life, the animal presented no peculiarities in the movements of the opposite side—it walked readily.

Basing themselves on their experiments and on this pathological observation, the authors consider themselves justified in issuing the following hypothesis:

1. There do not exist, either in the hemispheres or in the nucleus caudatus, voluntary centres, properly so called, but rather certain centres for special movements, attributed by an error of language exclusively to the will.

2. The nucleus caudatus and all above it form the cerebral apparatus for locomotion; in the neighboring convolutions we find the apparatus for the extension of the toes in the dog.

3. The will acts on these two apparatuses in the same manner as other physiological excitants; their integrity, like that of the whole medullo-spinal gray axis, is requisite.

4. In order to cause a complete hemiplegia in the animal, a double lesion is necessary: destruction of the nucleus caudatus and of the frontal convolutions; or rather, the severance of the two sets of fibres that descend from these two parts to a point where they are united into one bundle; that is, the section of the internal capsule below the nucleus caudatus.

In the dog the maximum current strength produces no movement of the members of the opposite side when it is applied on the surface of the frontal convolutions of the right side.

Dr. E. Hitzig, *Reichert u. Du Bois Reymond's Archiv*, 1874, 4, 393, gives an account of experiments performed by himself of extirpation or ablation of circumscribed portions of the cortex, and then observing the effects on motor and other phenomena. Two series of experiments were performed, the first on Hitzig's gyri *a*, *b* and *c*, lying anteriorly to the sulcus cruciatus, and the second series on the gyrus *d*, in the same region.

In the first series of five experiments the general result was that no disturbance of function was produced that could properly be attributed to the lesion, no matter whether the wound was deep or superficial. This confirms the author's previous experiments, in which this part had been irritated without reaction, while Ferrier had reported motor centres here also.

The same may be said of the second series, on the gyrus *d*, which also confirmed the results of irritative experiments. In a number of the cases, however, there was a disorder of the muscular sense, which was attributed to a more or less direct participation of the gyrus *e* (*gyrus post frontalis*, Owen) in the injury.

Nerve Cells.—M. J. Deitl, *Beobachtungen ueber Theilungsvorgange in Nervenzellen*, published in the *Sitzungs-Bericht d. Kaiserl. Akad. d. Wissenschaften, Math. Phys. Kl.* LXIX., 3, March, 1874 (abstracted in *Schmidt's Jahrb.*), describes some discoveries in the Gasserian ganglion of the frog, supplementing the observations of Mayer. He found these forms in cross sections from pieces that had been laid in perosmic acid. Here and there appeared the groups of nuclei similar to those described by Mayer, but not the nests like the medullary substance of the supra-renal bodies. The majority of the nerve cells lacked processes; whether this was due to the

method of preparation is uncertain. Two nuclei were often observed in one cell. The forms like divisions or bifurcations were not found in all frogs.

In a second paper, *Casuistische Beitrage zur Morphologie der Nervenzellen*, Deitl, for the most part, confirms the observations of other authors. Like Schwalbe, he recognized the fibrillary structure in the protoplasm of the nerve cells, the presence of two nucleoli in one nucleus, the connection by means of solid bundles (Bidder, Mayer). He also found the vacuoli described by Schwalbe in the cell protoplasm of the mole, in nerve cells of different species.

THE PHYSIOLOGICAL FUNCTIONS OF THE GANGLIA OF THE HEART.—Luigi Pagliani, *Lo Sperimentale* (abstracted in *Rev. des Sci. Med.*). The method employed by the author has for its object the avoidance of the violent excitation produced by sudden section or ligature of the heart. It consists in performing very small incisions, and in repeating them, after an interval of rest, as often as it is necessary. Thirteen experiments on frogs led to the following conclusions:

1. The nervous ganglia of the heart act as centres for reflection of sensory excitation in the external and lining membranes of the organ.

2. We cannot admit in the different ganglia such a difference of function as of some acting as centres of arrest, and others as agents of excitation, of the heart's movements.

3. The effects of variations in the movements or the arrest of the heart do not depend on the separation of the ganglia, the one from the other, but rather on the variations of excitation of the fibres that pass through these ganglia, or that are given out from their cellules.

4. The heart receives nervous fibres of various degrees of impressionability. Some, very excitable, and quickly exhausted, lose their functional activity by moderately strong excitations, while it is preserved and even augmented if the irritations are feeble or very slight. Others, less excitable, need strong excitations to call them into activity.

5. The very excitable fibres are found in the sinus of the venæ cavæ and about the auriculo-ventricular orifice. Those less excitable, under the heart in the myocardium around the aortic bulb, and thence are distributed to the heart.

THE RETINAL CIRCULATION.—A paper read by Dr. E. G. Loring, Jr., at the meeting of the N. Y. Society of Electrology and Neurology, Dec. 21, 1874, and reported in the *N. Y. Medical Record*, brings up several points of practical interest. His paper tended to show that the general circulation might be seriously affected by drugs, electricity, and direct interference, without the retinal vessels showing any decided change whatever. If, then, the circulation of the eye is a reflex of that of the brain, the influence on the latter of general disturbances of the circulation must be greatly overrated. The lack of pulsations in the arteries of the fundus was also discussed, and the question, whether there ought by analogy to be any pulsations in the cerebral arteries, taken up, and reasons were offered for inferring that by analogy there ought to be very little in those of the brain.

Of the several theories that have been proposed as to the cause of the so-called choked disk, that of Benedikt, of its neuro-paralytic origin, was preferred as least assailable, perhaps because it is least demonstrable.

In the discussion that followed, it was held by Drs. Noyes and Derby that caution should be exercised in the diagnosis of conditions of the cerebral circulation from ophthalmoscopic appearances. The latter thought that the unreliability of the instrument in these cases was conclusively proved.

VASO-DILATOR NERVES.—At the session of the Soc. de Biologie, Dec. 19 (reported in *Le Progres Medical*), M. Vulpian offered the following remarks:

"I have already, in the course of the past year, communicated to the Societe de Biologie the results of experiments on the vaso-dilator nerves that accompany the lingual and distribute themselves with it, to the two anterior thirds of the tongue. I showed that their electrization provoked a considerable afflux of blood, and that the circulatory activity was then, in that organ, as active as in the submaxillary gland.

"Next, I sought the origin of these vaso-dilators, and found that they did not belong to the lingual nerve itself, but rather to associated filaments of the chorda tympani. It is necessary, therefore, to extend the fact discovered by M. Cl. Bernard, and to say that the chorda tympani is distributed not only to the submaxillary gland, but also to the anterior two-thirds of the tongue, and that its excitation produces in each a notable vascularization.

"I have followed out these experiments, and have repeated them on the glosso-pharyngeal, which we know innervates the posterior third of the tongue. I divided the glosso-pharyngeal between where it leaves the cranium and the tongue, and excited its peripheral portion. I immediately produced a sanguine afflux analogous to that caused by faradization of the peripheral end of the lingual; the vessels became turgid at once under the mucous membrane, and developed their sinuosities at the base of the papillæ. In my first experiment, the redness of the posterior third of the mucous membrane was so great as to suggest an ecchymosis, but it gradually disappeared and in a few moments the original color re-appeared. I repeated this experiment many times, and always observed the same phenomena.

"In seeking to find whether we had here to do with a direct or a reflex action, all the adjacent nerves were divided: the lingual and the chorda tympani, the pneumogastric and the great sympathetic; and the same congestion appeared from the excitation of the peripheral portion of the glosso-pharyngeal. Only the great hypoglossal was left unsevered in my experiments; but there is little probability that the phenomena were reflex from this nerve. Moreover, I intend to divide this, also, but I believe that I can now safely say that we have here a direct action analogous to that exercised by the chorda tympani."

HAIRS AS TACTILE ORGANS IN MAN.—M. Jobert, whose researches in this direction on the rodents have been noticed in this journal, offered the following communication at a meeting of the Soc. de Biologie, Dec. 11, 1874 (reported in the *Gaz. Medicale de Paris*):

"I have followed out on man the researches on the tactile organs of mammals, with the following results :

"After examining eyelids of various animals, I sought the relations of the nerves with the cilia in man. From the researches of Krause and Gudden, we can believe that the corpuscles noticed by them in the conjunctiva are the most numerous terminations of the nerves of that region; but, on the other hand, we see that the free borders of the lids receive the greatest number of nerve fibres, and that while some of these fibres terminate in the superficial epidermis, others, and the majority, go to the follicles of the cilia.

"As in the lips of the mammals, the nervous bundles point to that part of the follicle situated immediately below the sebaceous gland. A single bundle comprising three or four tubes, or more frequently three or four bundles, coming from different directions, pass to that part of the follicle. Some tubes penetrate at once, but more often they run around the external surface of the follicle, forming a regular collar ; then they change their direction, become vertical, and pass parallel to each other into the substance of the follicle, where, after a certain course, they are lost to sight.

"The part of the follicle that receives these nerves is easily recognized at once by a kind of constriction of the external epithelial envelope of the hair; the vitreous membrane is separated at this point from the external epithelial sheath by a thin layer of cells appertaining to the latter.

"The vessels also penetrate the follicle at this point.

"We can perceive distinctly, by the aid of osmic acid: 1, That the nerves lose their medullary sheath, and that they penetrate as far as the vitreous layer, over which they course.

2. "That having lost their medullary sheath, they show in their track slight fusiform enlargements; they become so diminished in diameter as to make it impossible to measure them ; the course of the fibres here is either straight or sinuous, and the minute fibre terminates, as I have demonstrated, by a little hyaline expansion.

"I have counted as many as twenty-five nervous tubes penetrating the follicle at this point. (I have counted these on one section, but I was far from seeing the whole. Without exaggeration, we may say that there are at least forty or fifty.)

"I have endeavored to determine the presence of these fibres in the epithelial envelopes, but so far have not met with success ; I am still at work on this point.

"The little hairs on the surface of the eyelid do not show the same arrangement as those on its free border."

The author next states that he has examined the hairs of other regions, the upper and lower lip, nasal and auditory passages, etc., but has not found a similar nervous apparatus to that of the eyelids. He describes his method of preparation as follows :

"After maceration in dilute acetic acid, employment of osmic acid solution, 1 part in 200 of distilled water ; the smooth cuts were next treated with ammonia water, well washed in distilled water, then treated with the picro-carminate or the non-ammoniated solution of carmine. This operation renders it possible to follow the course of the fibres after parting with their myeline, to study their enlargements and see their terminations.

"The sections were made perpendicular to and parallel with the free borders of the lids."

Dr. Jobert concludes with the following paragraph :

"The physiological conclusions of this paper are easily drawn. Besides the explanation of the sensibility of the cilia, the nervous apparatus of which we have described, an extremely acute sensibility, as is easily shown, we have now a criterion for appreciating the sensibility of the tactile hairs found in the suborbital region and sides of the face of the higher animals, some of which are furnished in addition with a vascular sinus, but the majority are absolutely identical with the lashes of our eyelids, not possessing the sinus. At present I am engaged in the study of their apparatus in the fœtus, and will give the results in a future communication to the Society."

Chemical Constituents of the Brain.—The following are the conclusions of a recent memoir by Gobley, as given in the *Progres Medical*, Jan. 2 :

1. The cerebral substance in man contains about eighty per cent. of water.

2. It contains two albuminoid substances, one soluble in water and not distinguishable from albumen, the other insoluble in water, and for which the name cephaline is proposed.

3. The fatty matter of the brain is chiefly composed of cholesterine, lecithine, and cerebrine ; it also contains traces of oleine and margarine.

4. The brain contains the usual salts of the system, and extractive matters, some of which are soluble in water and alcohol, and others in water and not in alcohol.

5. During putrefaction the cerebral pulp furnishes acid products, among which we recognize oleic, margaric, phospho-glyceric, and phosphoric acids.

6. The average composition of the brain may be given as follows-

Water	80.00
Albumen	1.00
Cephaline	7.00
Cholesterine	1.00
Cerebrine	3.00
Lecithine	5.50
Oleine, margarine, creatine, etc.	1.50
Chlorides, alkaline phosphates and earthy matter	1.00
	100.00

Distribution of the Collateral Nerves of the Fingers.—Paper read by M. Richelot to the Soc. Anatomique, Paris, October 30, 1874 (reported in *Le Progres Medical*).

This memoir has for its object, the demonstration that the radial and cubital or ulnar nerves, only furnished collateral dorsal branches to the thumb and little finger, and that stopping at the base of the three middle fingers, they terminate in the skin of their first phalanges ; while the collateral dorsals of these three fingers come exclusively from the palmar collaterals: that is to say, from the median nerve as far as to the external border

of the ring finger; and from the palmar branch of the cubital to the internal border of that finger. This memoir, therefore, refutes the classic opinion, given in all the works on anatomy, according to which the radial and cubital distribute themselves to the dorsal surface of all the fingers. It limits more exactly than has previously been done, the spheres of distribution of the three nerves of the hand, and so permits a more accurate diagnosis of certain nerve lesions; while at the same time, it explains certain apparently abnormal appearances described in the observations that have been made up to the present time. Undoubtedly, we shall still find many apparent anomalies in the distribution of the anæsthesia following nervous lesions; on the one hand, because of the difficulty we experience in knowing with certainty the state of the sensibility in certain cases and in certain patients; and on the other, because of the vicarious or recurrent sensibility, the effects of which may be variable as to locality and intensity. It is none the less true, however, that M. Richelot's memoir establishes a more exact relation between anatomical and clinical facts, than has hitherto been known.

THE COURSE OF THE FIBRES IN THE CORD.—Dr. P. Schiefferdecker, *Schultze's Archiv.*, XIV, 471, 1874. We copy from *Schmidt's Jahrbuecher*, No. 12, 1874, the following abstract by Theile, of Dr. Schiefferdecker's paper:

In three beautifully executed plates, the author gives illustrations of longitudinal and transverse sections of the hardened and colored spinal cord of a dog, taken from the lumbar enlargement. The investigation is especially in regard to the course of the fibres in the gray matter. Besides the small ganglion cells of the gray substance, three principal groups of larger ones are everywhere present in the cord of dogs: one lateral, containing the greater number and the largest cells (.07 mmtr. diameter) opposite the central canal; one anterior group situated on the border of the anterior column, where the anterior roots penetrate, with cells .05 mmtr. in diameter; and a middle posterior group, with the fewest cells, but of the same size as the preceding.

The text of the memoir is mainly an explanation of the plates, and not capable of condensation; still Schiefferdecker, in conclusion, states that the structure of the spinal cord shows an extraordinary variety in the connections of its elements.

1. The point of exit of the fibres from the white substance into the gray shows: *a*, fibres, which passing out from a given point, enter the gray substance at different heights; *b*, fibres, which originating at different points in the white substance, bend into the gray matter at a particular point; *c*, fibres, which belonging to upright bundles, also turn inwards into the gray matter at special points, but which frequently, in their horizontal course in the white substance, anastomose right and left with each other, and enter the gray matter at the same level, but at different points.

2. The fibres in the gray matter mingle in the most various manners, as follows: *a*, the fibres form simple networks, without participation of the ganglion cells; for instance, the above described bundles, as in the junction of the white and gray matter, connect themselves (primary network); or bundles of fibres in the midst of the gray matter that are already joined into

a network, again anastomose in a similar manner (secondary network); *b*, larger sections of the cord are connected by bundles of fibres, especially the two halves of the cord through the anterior and posterior commissural fibres, and also points at various heights in the cord through bundles that pass perpendicularly in the gray matter.

3. Apparently, also, the ganglion cells mediate in the connection of various kinds of fibres by means of this dense network.

4. The manner of the entry of the fibres of the posterior roots, with their crossing and their subsequent horizontal or vertical course, likewise adds to this commingling of fibres.

In figures 8 and 9, the author gives a cross-section from the cord of a dog, taken about the level of the fourth cervical vertebra, where, directly on the margin of the gray substance between two divided blood-vessels, there is seen a ganglion cell with a nucleus and four processes, two of which are lost in the gray matter behind; while the other two penetrate through the white columns into the anterior roots, in which they can be followed for some distance. This, on the one hand, gives us an instance of a ganglion cell from which two processes go into the anterior roots, and as nerve fibres, pass towards the periphery of the body; and, on the other hand, it affords us a proof that a nerve cell may have more than one Deiters axis cylinder, a fact observed more than twenty-five years ago, in ganglion cells of the central organs of the ray, by R. Wagner.

Innervation of the Uterus.—Goltz and Freusberg, *Pflueger's Archiv*, IX., X. and XI., December, 1874, p. 552, give an account of some interesting observations on a young bitch, whose spinal cord had been cut at the level of the first lumbar vertebra. The wound had healed, and the animal regained its usual health; but, of course, her hinder parts were completely paralyzed both as to motion and sensation. She became a kind of laboratory pet, and developed a number of interesting peculiarities under observation. During this time she became fully matured, and the periodical sexual phenomena began to show themselves in congestion, etc., of the outer generative organs, and an unusual kindness towards male representatives of her species. By the aid of the laboratory servant (Institutdiener), the sexual act was accomplished with two different dogs, on three separate occasions, and pregnancy resulted. Early in the period of gestation, the mammary glands began to swell, the posterior ones first, and then the anterior; the animal's appetite increased; and at the end of about the usual period, she was delivered of a healthy living pup, and shortly after, two dead and partly decomposed fœtuses were artificially removed. The mother showed the same maternal tenderness to her offspring, that is seen in other dogs whose normal conditions have never been disturbed. The operation, however, proved fatal to her; she died a few days later from peritonitis, induced by injuries received during parturition.

The significance of this observation lies in the fact, that complete division of the cord at the level of the first lumbar vertebra, performed in infancy, with the consequent resulting absolute motor and sensory paralysis of the hinder parts, not only did not materially interfere with the ordinary

processes of reproduction, but also allowed the periodic moral and emotional phenomena to make their appearance, as in the normal condition, after the complete severance of what are usually supposed to be the principal, if not the only effective routes of nervous communication between the uterus, etc., and the brain. There remain to be seen the fibres of the sympathetic, over which the communication may exist; but Dr. Goltz is inclined to admit still another hypothesis as possible, namely: that the influence of the excitation of the generative organs may have in some way been carried to the brain through the agency of the blood, and the reflex activity of other parts thus aroused. This explanation, though rather novel and interesting, seems to us, however, hardly necessary while the communications by way of the sympathetic and its connections with the cord are so numerous, and in our opinion, so sufficient.

The fact that conception may occur with perfect anæsthesia, is well known, and the observation affords nothing new as to this point; there seems to be no probability that in this case, the animal was in any way specially conscious of the sexual act.

The observation is also suggestive and instructive in regard to the phenomena of pregnancy, the growth of the mammary glands, etc.; and also, those of parturition, and of the general sexual development of the animal. The cutting off of the principal nervous connection of the sexual organs with the brain, certainly did not, in this case, have any such effect on the general development of the animal, as is produced by such mutilations as castration, etc. The question whether such effects are produced through the agency of the nervous system or not, is not positively answered by this observation; but it seems sufficiently evident, that it is not necessarily through the agency of the cord.

Perhaps the most important bearing these facts possess, is the evidence they give of an independent centre in the lumbar cord for the uterus and its appendages. Kœrner, and others, had shown that the principal motor nerves for the uterus arise from about the third and fourth lumbar vertebræ, and the investigations of Schlesinger have indicated that the uterine centres are situated in the cord below the fourth ventricle. This observation serves to narrow the field still further, and to support the view above stated.

The fact that only one living pup was brought forth, and the other two dead ones only extracted artificially, is not explained; but it is suggested by Goltz, that the partial degeneration of the lumbar cord after its division, and its probably earlier exhaustion, as well as the perhaps total inaction of the diaphragm, may have had something to do with it.

The only observation in any way similar to this is one of Brachet, who cut the lumbar cord of a dog between the second and third lumbar vertebræ, and immediately afterwards managed to have the animal become pregnant. The dog died a month later, and the post-mortem revealed an embryo in the uterus as large as a may-beetle. He also relates the case of a paraplegic woman who became pregnant, whose child had to be artificially delivered, the uterine contractions being so weak. From these facts, he concluded that division of the cord disabled the uterus from contracting, so as to spontaneously expel the fœtus. This opinion is disproved by the experiment of Goltz, and also by an observation of Nasse, of a female, who, during

pregnancy, suffered a dislocation or breakage of the third and fourth cervical vertebræ, with consequent general paralysis of the body below the point of the injury. The child was, nevertheless, naturally and painlessly delivered a few days later. Brachet's case being one of disease of the cord, probably involving the lumbar region, this fact is probably enough to account for its peculiarities. These observations on the human subject are also of value, as indicating the existence of a special spinal centre for the uterus.

THE following are the titles of some other recent papers on the anatomy and physiology of the nervous system:

E. CYON, On the Physiology of the Vaso-Motor Centre, *Pflueger's Archiv*, IX. Bd., 11 and 12 Heft, 499; VINTSCHGAU and HONIGSCHMIED, Experiments on the Reaction Time of a Sensation of Taste, *Ibid*, X., 1 Heft, 1; HERMANN, New Measurement of the Rapidity of Propagation of Muscular Irritation, *Ibid*, 48; BOROSNYAI, LUCHSINGER, STEGER, and PESTALOZZI, Experiments on the Cortex of the Brain, *Ibid*, 2 and 3 Heft, p. 78; ENGESSER, Does there exist a difference in the Galvanic Reaction of a Nerve, when the battery is opened or closed with the anode or cathode? *Ibid*, p. 147; BOTKIN, On the Reflex Phenomena of the Cutaneous Blood-vessels and the Reflex Perspiration, *Berliner Klin. Wochenschr.*, Nos. 7, 8 and 9; NOTHNAGEL, Experimental Researches on the Functions of the Brain, fourth part, *Virchow's Archiv*, LXII. Bd., 2 Heft, 201; BUCHNER, Nerve Irritation by Solutions of Indifferent Substances, *Zeitsch. f. Biologie*, X., 3, 373; BROADBENT, Physiology of the Act of Vomiting, *Practitioner*, Feb., 1875; BENEDIKT, The Physiology and Pathology of the Pyramids, *Wiener Med. Presse*, Feb. 28; HUGUENIN, Contribution to the Anatomy of the Brain, *Archiv f. Psychiatrie*, vol. 2, 341; PUTZEYS and TARCHANOFF, The Influence of the Nervous System on the Condition of the Vessels, *Reichert & Du Bois Reymond's Archiv*, Heft 3 and 4, 1874, pp. 371 and 385; STEINER, On the Innervation of the Frog's Heart, *Ibid*, Heft 4, 474; SACHS, Anatomical and Physiological Investigations on the Sensory Nerves of Muscles, *Ibid*, 491 (continued from p. 195).

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

MONOMANIA.—At a meeting of the New York Medico-Legal Society held Jan. 28th, Edward Patterson, Esq., of the New York Bar, read a paper on "Monomania as Affecting Testamentary Capacity." He summarized the views presented as follows:

The law as it now stands, and as it should be administered upon the subject of partial insanity (and almost all the cases of partial insanity are cases of monomania merely), is of comparatively recent origin; it is the product of improved knowledge respecting the diseases of the mind, and more liberal as well as accurate views respecting the freedom of the will and the restraints

proper to be put upon testamentary powers. It consists of a rule susceptible of application to all cases of the character under consideration; but one which is affected by the general tendency of courts to revert to antiquated ideas upon topics resting purely in authority; a rule which is liable to be lost sight of in the attempt to find, in cases of monomania, evidences of general insanity. It does not require that to the making of a valid will a man shall be bias and thwart in all his mental processes, but it is a rule which discriminates in favor of those who are the natural objects of bounty and affection; and it prevents injury and injustice being done to such because of a testator's delusions, fancies and irrational prejudices, in cases where they have evidently affected his acts; but it does not deny the testamentary privilege to the man whose eccentricities, beliefs, follies or infatuations may be as absurd and fantastic as the incoherencies of a half-remembered dream, provided in all other affairs of life he is of competent judgment, and his vagaries have not led him to do injustice to his kindred, or to harden his heart against those who are the proper objects of his testamentary bounty.

W.

Granular Cells in the Cord in the Insane.—Dr. Adler, of Schleswig, publishes (*Archiv f. Psych. u. Nervenkr.*, v. I., 1874,) a paper on this subject, from which we extract the following conclusions:

1. The granular cells in the spinal cord of the insane are found preferably in the connective tissue of the septa, the radiations of which they follow in the nerve tissues. They are found most abundantly in the septa themselves

2. The extension of these cells in the cord, since they are found with the vascular septa, follows the course of the vessels in a horizontal as well as in a vertical direction.

Zona of the Back.—Zona situated in the dorsal region, at the level of the seventh dorsal vertebra and extending itself toward the left side. Besides the pruritus of the surface, the patient complained of a more deeply situated pain, which Dr. Gine fixed by pressure about two centimetres below and external to the eruption. The author believed he had here to do with a neuralgia of the cutaneous division of the seventh dorsal pair, causing an eruption of zona corresponding to the terminal extremities of the nerve. A hypodermic injection, .3 gr. of morphia in 15 grs. distilled water, was given, and followed by immediate relief of the superficial itching and the deep-seated pain, and rapid resolution of the eruption, of which there remained in four or five days no trace except the already commencing desquamation.

The author concludes from this observation: (1) that it confirms the doctrine of Hebra, who considers zona as an eruption corresponding to the terminations of certain cutaneous nerves; (2) that to the varieties indicated by Hebra according to the location, we must add the *zona dorsalis;* (3) that the name hèrpes or nervous eczema is more applicable to this affection; (4) that topical remedies applied to the surface of the skin are little efficacious, on account of the alterations the disease induces in the function of absorption; (5) that it is much more rational to carry the remedy to the point where

the neuralgic pain is felt; (6) and that the success of the morphia injection, relieving at once the pain and causing the disappearance of the eruption, is an encouragement to the generalization of this mode of treatment.—*Independencia Medica de Barcelona—La France Medicale*, Dec. 12, 1874.

HYDROPHOBIA.—Dr. S. P. Crawford, of Stockton, Cal., gives, *Nashville Journal of Med. and Surgery*, Feb., an account of four fatal cases of this disease caused by the bite of a coyote (*Canis latrans*) in western Texas. Of the four that were bitten, one succumbed in less than a month from the time the bite was received, a second about two months, the third in four months, and the fourth some eighteen months after the injury. The period of incubation varied from 20 to 547 days in these cases.

The author states that this last case was the only one that he had ever heard of as occurring in his State, where he says the disease is entirely unknown.

VASCULAR CEREBRAL LESIONS IN THE INSANE.— Dr. Adler, *Archiv f. Psychiatrie*, v. I., 77, describes the alterations found by him in the smaller vessels of the brain in lunatics. After referring to the enlargement of the lymph spaces described by Durand-Fardel, and which are most commonly observed in the ganglia of the base, the corp. striata, the capsules, and nucleus lenticularis, he describes cystiform enlargements which he observed in the corp. striata and nucleus lenticularis of a demented woman, seventy-two years of age. Close examination revealed a vessel in the centre of these cavities. The outer wall of these cysts seemed to be formed by a separation of the external tunic of the vessel, the intermediate space forming the cavity Inside the cyst were found pigmentary granulations which the author considers to have passed through the coats of the vessel by diapedesis.

These cystiform enlargements are most commonly found in long-standing cases of dementia of old people, but they may occur in young persons, without regard to the particular form of insanity.

Another modification of the vessels noticed by the author, was a thickening and fusion of the adventitia with the external tissues. Such appearances had already been noticed by Rokitansky, who considered them as due to increase of the connective tissue. These thickenings form little gray patches and stripes in the brain substance along the blood-vessels, and appear in fine sections like thickly-massed nuclei and cells with interlacing fibres. The nerve fibres seem entirely absent, but besides the cellular elements there are amorphous pigment granules and amyloid bodies. The vessels course through the mass, the outer boundaries of which are not easy to determine.

MENIERE'S DISEASE.—Dr. Voury, *Thesis de Paris*, 1874, sums up his paper on this subject in the following conclusions, which we extract from the *Bull. Gen. d. Therapeutique:*

1. "Meniere's disease is an affection characterized by deafness, humming in the ear, attacks of vertigo, ordinarily accompanied with serious disorders of equilibrium, syncope, nausea and vomiting.

2. "The lesion is in the labyrinth, and is of a congestive, inflammatory or traumatic nature.

3. "Meniere's disease may be either primary, secondary or traumatic.

4. "It should be distinguished from simple auricular vertigo, by the gravity of the deafness insisted on by Meniere, and which is the index of the lesion.

5. "The nervous accidents are, in the opinion of the majority of physiologists, reflex phenomena.

6. "The deafness is incurable."

Notwithstanding this last conclusion, Voury in his paper advises the application of the cautery and a seton behind the ear, according to the recommendation of Prof. Charcot, and the bromide of potassium and chloral for the nervous accidents.

General Paralysis.— M. August Voisin read a paper at the *seance* of the Acad. de Medicine, Jan. 26, the conclusions of which are given as follows in *L'Union Medicale*:

General paralysis is an inflammatory affection; it is accompanied by fever. This fever has its special symptoms and march; it presents a certain periodicity, as was shown in the graphic curve annexed to the paper.

The histological characters of the cortical substance are entirely similar to the characters presented by the other chronic visceral inflammations, and consist in arteritis, in transudation of sanguine plasma, the organization of this plasma into cellules and embryoplastic nuclei in infinite numbers, then into fusiform bodies, and finally into fibrillary tissue in the walls of the vessels and the adjoining nervous substance.

Color-Blindness.— Dor, *Lyon Med.*, XVI., 13 (abstracted in *Rev. des Sci. Med.*):

It is well known that Helmholtz, basing himself on the physical theory of three fundamental colors, allows that there may exist in the retina three kinds of elements sensible to colors: those for the perception of red, those for green, and those for violet or blue.

This author cannot accept this theory, to which he first offers the objections of Prof. Wartmann, and then he adds the following considerations deduced from his own observations:

a. The equal length of the spectrum in two brothers affected with Daltonism, of whom the one was blind to the red, and the other to the green, when in these cases the elements for the perception of red and perhaps of green, ought to be wanting.

b. The fact that all the individuals affected with pathological color-blindness are affected with atrophy of the optic nerve, in consequence of a lesion of the brain or of the spinal cord.

c. The fact already noticed by H. Mueller, that in these cases the fibrillary and cellular layer of the retina and optic nerve is atrophied as far as to the cerebrum, but in no case does the atrophy extend to the layer of rods and cones.

d. The circumstance, on the other hand, that in veritable retinal affections and in choroido-retinitis the perception of colors is enfeebled, but never perverted.

All these facts lead the author to formulate the following conclusions: Color-blindness is a cerebral affection and the Young-Helmholtz theory cannot be sustained.

Paralysis of the Diaphragm.—Dr. W. Alyschewsky publishes in the *Berliner Klin. Wochenschrift*, August 31, 1874, the results of experiments conducted by himself in the laboratory, and under the direction of Prof. Botkin, of St. Petersburg, with the object of experimentally testing the theory of the latter, that the development of the disturbances in nutrition in the lungs, in typhus fever, has a direct connection with the weakening of the muscles of inspiration. The following is his summary of his experiments:

1. By the section or removal of a small piece of the root of the phrenic nerve in the neck, there was produced a complete paralysis of the diaphragm, in opposition to the anatomical teachings, and in accordance with Traube's observation. This could be well proven by opening the abdominal cavity, and observing the diaphragm passive in the act of respiration.

2. This paralysis of the diaphragm, whether unilateral or bilateral, is not only not fatal, but is fully compensated by the increased activity of the other muscles of respiration. Dogs so mutilated, made an apparently complete recovery; but on examination by opening the abdomen, the diaphragm was found still paralyzed.

3. The compensation for the loss of the active diaphragm in breathing, is accomplished either by greater frequency of respirations or by deeper ones; the latter most frequently in young powerful animals. Artificial production of hydro- or pneumo-thorax in dogs, plainly caused much greater distress in breathing, than paralysis of the phrenics.

4. Auscultation and percussion of the animals thus operated upon, revealed that the lungs still expanded in their longitudinal direction, though less so than before. This can be confirmed by observing the movement of the liver in the animal after it has been opened; the organ expands and contracts not merely by the action of the diaphragm, but also by that of the other respiratory movements. Observation of the diaphragm in animals whose abdomens have been opened, shows that this muscle is not merely drawn up into the thorax by the action of the other inspiratory muscles, but that it becomes larger and smoother, so as to fill the whole base of the expanded chest. Beginning at the lower border of the lowest rib, the diaphragm does not at once part from the thoracic walls, but lies parallel to them for a narrow space. Luschka and Henle state, that this is the condition during the pause of breathing after the expiration; so when the healthy diaphragm begins to contract, or the paralyzed one to passively expand, it leaves the ribs; the number of points of contact between the costal and diaphragmatic pleura diminish, and the so-called negative pressure helps on the operation; the lungs elongate, and the liver sinks, in proportion as the chest dilates. In agreement with this observation, the extent of the elongation of the lung

was found to be less in an animal with the phrenic nerves recently cut, than in one whose nerves had been cut some time, and the compensating muscles had attained their full development. By percussion, good diagnostic signs of the condition of the diaphragm were found. Alyschewsky and Botkin have shown that the lower border of the liver rises during inspiration, and sinks during expiration.

5. By direct observation in opened animals, Alyschewsky has shown that directly after the section of the phrenics, there is an increase in the height to which the diaphragm rises during the pause of respiration. For example, if before the section it stood at the level of the ninth rib, after it, it was found to stand at the eighth. The explanation of this phenomenon, according to the author's opinion, is to be found in the tonicity of the muscle.

6. Another phenomenon observed after the division of the nerve, was the projection of the upper part of the chest on the injured side. This is also explained by the *tonus;* also in the upper intercostal muscles; which, under different circumstances, may be quite variable.

7. An increased dilatation of the lower chest follows the division of the abdominal muscles in animals with paralyzed diaphragm. This is explained by the *tonus* of the expiratory muscles.

8. The author explains the negative or diminished atmospheric pressure on the inside, as compared with that outside of the chest, by this tonicity of the muscles.

9. In the autopsies of animals that were killed by puncture of the fourth ventricle, at periods after the section of the phrenic nerve varying from three days to a year, there were found alterations in the lung of the injured side; a greater or less degree of hepatization of the inferior portions, and an emphysematous condition of the upper lobes. In three cases out of fifty-six, there was a hypostasis of the inferior lobe; once on the right side with both phrenics cut, and twice only on the paralyzed side.

10. These experiments, together with theoretical considerations and clinical observations, show that weakened or paralytic conditions of the diaphragm, play a large part in the production of congestive troubles of the lungs in various disorders.

11. Experiments by directly faradizing the phrenics, both cut and intact, in the neck, indicated that contraction of the diaphragm, in opposition to the generally received opinion of Duchenne, is not fatal. With the undivided nerve, the tetanus, the stoppage of respiration and heart pulse, gradually disappear as the experiment is continued, and are dependent on irritation of the sensory fibres included in the phrenic, rather than on the contraction of the diaphragm—they are of the nature of reflex phenomena. They do not appear on faradization of the peripheral portion of the divided nerve. Duchenne's view is due to the fact, that he did not carry his experiments far enough, and operated only on the undivided nerve, thus introducing complications not dependent on the contraction of the diaphragm.

TETANY.—Felix Simm, *Inaug. Diss.*, Breslau, 1874 (analyzed by Barwinkel in *Schmidt's Jahrb.*).

Simm gives in this memoir, first a historical sketch of the subject of tetany, from Sternheim (1830) down to the latest publications of Kussmaul, Erb, and Riegel.

Next he gives the symptomatology. He characterizes tetany as a painful tonic cramp, which simultaneously attacks the corresponding upper and lower extremities; advances with atypical intermissions; is introduced by, and accompanied with, disturbances of sensibility; advances in a centripetal direction ; usually it gives the hand a claw-like appearance, but sometimes the fist is tightly closed; sometimes the attack lasts for hours, and not unfrequently it involves all the extremities. The symptom described by Trousseau is quite characteristic, namely: the artificial production of the convulsion by pressure on the arteries and nerves of the limb; and so also is the symptom first observed by Dr. O. Berger, of Breslau, the lasting spontaneous or artificially produced by pressure, pains over a number of spinous processes, and the possibility of causing the attack by mechanical or electrical irritation.

By this collection of symptoms the disorder may be distinguished from the following affections which simulate it:

1. From simple tetanus, by the lack of trismus, and the predominant affection of the extremities.

2. From spastic motor neuroses such as writer's cramp, by the latter only affecting certain groups of muscles, and by its connection with special occupations.

3. From hysterico-tonic convulsions, which are accompanied with other hysterical symptoms, and slight tremor or fibrillary contractions of the affected muscles.

4. From the convulsive form of ergotism—here the chief diagnostic feature is the above-mentioned symptom of Trousseau.

Among the ætiological conditions, its preference to the periods between the first and fourth, and the seventeenth and thirtieth years of life, is worthy of consideration; exhausting influences, diarrhœas, intestinal worms, cold, emotional affections, are also to be reckoned as immediate causes in cases of relapses, and where there is a hereditary tendency. Epidemic attacks are doubtful.

We know nothing certainly of the pathological anatomy of the disease; nevertheless, the symptoms plainly indicate that the spinal cord or its enve l opes, is the seat of the trouble.

Nor do we know anything more surely in regard to treatment. A spontaneous cure is the rule. If any direct cause is known, it must indicate the treatment. Dr. Berger did not obtain the favorable results with galvanization reported by Erb. Chloral is useful against certain symptoms; bromide of potash, opium and arsenic, are still to be particularly tested.

In conclusion, Simm reports two cases; one from the practice of Dr. Berger, the second from Lebert's clinic.

ATROPHY OF THE MUSCLES OF THE THUMB — CONNECTED LESION OF THE CORD.—MM. Prevost and David, *Archives de Physiologie Norm. et Path.* (abstracted in *Revue des Sciences Med.*), describe a case of fatty degen-

eration and atrophy, exclusively limited to the muscles of the thenar eminence, dating back, probably, to childhood, with at the same time a co-existing limited lesion of the spinal cord, characterized by (1) a manifest atrophy of the right anterior root of the eighth cervical pair; (2) a very slight atrophy of the anterior right root of the seventh cervical; (3) an atrophy of the anterior horn of the gray substance at this level, extending over a length of two or three centimetres (an inch or more); the external group of cells having almost entirely disappeared at the point where the alteration was most decided. The authors consider that the muscular atrophy was developed as a consequence of this local myelitis. This observation serves to show that the muscles of the thenar prominence are innervated by nerves leaving the lower cervical portion of the spinal cord.

Carcinoma of the Dura Mater involving the Gasserian Ganglion.—M. Fioupe, Interne of the Hospital Lariboisiere, reports in *Le Progres Medical*, Dec. 5, 1874, the case of a young man who entered the hospital, February 9, 1874, suffering from severe attacks of neuralgia, pains in the whole right side of the head, and dating back some three years. No history of hereditary tendency to nervous disease worthy of note, except that his father, aged seventy-two, suffered from neuralgic pains in the right eye. There was also no previous syphilitic affection, or any antecedents of drinking habits.

On his admission he presented a well-marked double exophthalmia, most pronounced on the right side, where there was also an internal strabismus. The pupils were normal, the tears profuse during the attacks from the right eye, which then also became somewhat reddened. The other organs of sense showed nothing peculiar.

Some days after admission the patient complained of severe pains in the alveoli of the right upper jaw, which were only alleviated by hypodermic injections of morphia. An ophthalmoscopic examination by M. Panas revealed a very manifest neuro-retinitis, symptomatic of compression of the optic nerve.

The patient shortly after left the hospital, but returned again on the 20th of April. The neuralgic pains were as severe as ever, the exophthalmia of the right side was much more noticeable, and sight was much affected in that eye ; objects were perceived, but not recognized. Some drops of pus exuded from the right auditory passage, and hearing on that side was much enfeebled. The sense of taste was completely abolished on the right half of the tongue, and the patient complained of dryness in the right nasal passages which prevented the appreciation of odors while the other nostril was compressed. The general sensibility and the motility remained intact.

In the beginning of May there appeared a slight ulceration of the cornea of the right eye, the sight of which was completely destroyed, with also congestion of the retinal vessels. About the middle of the month the patient complained of vertigo and became uncertain in his walk. On the 28th, he received a fall, and had to be transported to his bed. The next morning there was found to be an incomplete paralysis of sensibility and motility

of the left side, not, however, involving the face. Delirium set in on the 11th of June, and death followed five days later.

On the autopsy there was found a carcinomatous growth of the dura mater, compressing the right ganglion of Gasser in such a manner that it was absolutely impossible, by the most careful dissections, to follow out its branches. The ophthalmic branch, the superior and inferior maxillary could only be followed to their emergence from the tumor. The integrity of the inferior maxillary nerve was inferred from the perfect function of the masticatory muscles, but it could not be determined anatomically. The facial and auditory nerves were situated behind the tumor, and were apparently healthy.

Craniometry of the Insane and of Criminals.—Arrizo Jamassia, *Rivista di Medicina Chirurgia*, etc., Aug., 1874 (abstracted in *Rev. des Sci. Med.*). This work is based upon a very complete examination of forty-one crania of lunatics, and these results are compared with those obtained by Prof. Lombroso on the crania of criminals (Rendic. dell. Inst. Lomb., 1873).

From these researches it follows that the average cranial capacity is on an average in lunatics, 1,399 c.c.; in criminals, 1,389 c.c.; and in healthy men, 1,552 c.c.

The averages of the cranial capacity in the different forms of insanity are:

Monomania	1,464	Mania	1,422
Melancholia	1,445	Gen. Paralysis	1,365
Pellagra	1,429	Epilepsy	1,350

The facial angle of lunatics averages 72.4. The degree of prognathism is still more marked in criminals, where it measures only 70.

The author gives also the results of very numerous measurements of the cranial circumference, the area of the occipital foramen, and the capacity of the orbital cavities.

Sympathetic Amaurosis.—Dr. P. Lardier, *L'Union Medicale*, Dec. 15, 1874, gives an account of a boy eight years old, who, after the removal of a bandage that had been applied for a conjunctivitis showed an amaurosis of the right eye, determined by various tests, that had been hitherto altogether unsuspected and not indicated by any previous symptom. On examination, there seemed to be no connection between the inflammatory trouble and the paralysis of sight, and search was made elsewhere for the inflammatory trouble. Two observations of Hancock, cited by Bouchut, led to the supposition that there might in this case be a dental lesion, and on inspection a carious molar was discovered. With the consent of the parents, though greatly to the dissatisfaction of the little patient, this was extracted, with the surprising result of immediately and permanently removing the trouble.

Peripheral Facial Hemiplegia.—The principal conclusions of a memoir by M. Bernard, *Thesis de Paris*, 1874, are thus given in the *Bulletin Generale de Therapeutique*, Dec. 30:

The paralysis of the seventh pair has two principal causes : 1st, mechanical ; 2d, rheumatism or cold.

The alteration of the facial nerve is very probable, but is not certainly demonstrated.

The diagnosis is to be made by an examination of the causes, physical and functional signs, and especially by the symptoms of the electric contractility of the muscles.

The prognosis is based on the cause and the degree of the paralysis ; this degree is indicated by the electric currents.

The treatment consists in the stimulation of the paralyzed parts (by vesicatories, strychnine, etc.), and in the employment of electricity, either faradic or galvanic, according to the degree of paralysis.

PARAPLEGIA BY COMPRESSION.—In the short preamble with which we introduced the "Conference" of M. Charcot, on Potts' Disease (No. 15, Dec., 1874), we said that the effects of slight compression of the spinal cord were almost identical, whatever might be the cause of the compression, but that we sometimes have also to recognize symptoms appertaining to this cause itself. That was what was especially done for Potts' Disease in that lecture.

In the lecture of December 6th following, M. Charcot showed an example of paraplegia due to simple and direct compression of the cord by a lesion resulting from a fall from a height. In this case the paraplegia shows its own proper character ; it consists in a simple diminution of sensibility. When we pinch the patient, she feels it ; but, in a certain fashion, she feels first a slight reflex contraction, then a kind of vibration, next a vague indeterminate sensation, sometimes of heat or cold, sometimes of pricking. There is besides a tendency to extension. This vibration, which commenced at the point touched, descended to the toes, then went upwards to the pelvis, and thence downwards on the other limb. Several minutes were occupied in this evolution. Only in cases of compression of the cord do we notice this kind of dysæsthesia.

This phenomenon recalls that described by Cruveilhier, under the name of retardation, but it is in reality different. In the phenomenon described by Cruveilhier, there is actually a delay in the perception of the sensation ; when we pinch the patient, he only feels the pain after some thirty seconds. In this case, however, the vibration occurs almost immediately, and lasts a quarter of an hour or twenty minutes.

Another of the proper characters of paraplegia by compression is the manifestation of pseudo-neuralgias, such as we do not observe either in myelitis, or with intra-medullary tumors.

M. Charcot made no attempt to explain these facts ; he has been forced to recognize them. Those who seek an explanation may perhaps find the elements in the physiological theory of associated sensations ; but he declares that, as for himself, he only takes account of the facts.—*Gaz. des Hopitaux*, Dec. 19, 1874.

EXOPHTHALMIC GOITRE.—M. Fereol recently presented to the Soc. Med. des Hopitaux the case of a patient affected with exophthalmic goitre and

offering some special symptoms worthy of note. The goitre was principally on the right side, the exophthalmia very slight, and though the former had lasted eighteen months, it was only within one month that the patient had complained of the palpitations. The march of the disease, therefore, was the reverse of what usually appears, the goitre and the exophthalmia being commonly considered the direct effects of the cardio-vascular neurosis. But M. Fereol observes that this anomaly is more apparent than real, as the irregularity of the heart's action may have an existence long before it is perceived by the patient.

The most notable symptoms, however, that complicated this case, affected the general sensibility and motility, and have not hitherto figured among the phenomena of this disease. They manifested themselves some ten months after the appearance of the goitre, and were ushered in by violent headache, soon followed by vertigo, titubation, tremor, inco-ordination of movements, an irresistible propulsion toward the right side, diminution of strength on the same side, diplopia in certion positions of the eyes, sensations of cold or heat unequally distributed over the surface, etc., etc. The patient had never suffered from lancinating pains, but he presented a well-marked dysuria, and at one time he had spells of vomiting, that he attributed to the digitalis he had taken. Examination of his eyes showed a right diplopia above the horizontal, with other signs of paralysis of the fourth nerve. The ophthalmoscope revealed only a greater paleness on the right side, with more enlarged and flexuous veins than on the other.

The question in this case was whether all these symptoms were to be referred to the cardio-vascular trouble, or whether there were not two separate neuroses conjoined in the patient. The acute pains characteristic of locomotor ataxia, together with the different character of the ocular disturbances, led M. Fereol to exclude spinal sclerosis, which had been suggested by M. Dujardin-Beaumetz. Altogether he was inclined to consider it as a case of exophthalmic cachexia, complicated with special symptoms.

———

Aphasia.—The following are Dr. Ferrier's views regarding this condition, as summarized by the reviewer, in the *Edinburgh Med. Jour.*, Dec. 1874, of his paper in the *West Riding Med. Reports*, IV., 1874:

The motor centres for the nerves going to the muscles used in speech are situated in the convolutions of the operculum (which is included between the ascending and horizontal limbs of the fissure of Sylvius, and immediately overlaps the island of Riel), and either the right or left centres act upon the muscles of both sides; but the memory of muscular adaptation of the motions necessary to articulation is only on one side, and that, in most cases, on the left. The memory for the adjustment of the same muscles, when used for a different purpose from that of articulation, as in mastication, seems to lie on both sides. Dr. Ferrier accounts for aphasia with lesions of the right side of the brain, by supposing that the memory of articulated words lies in that side, just as some individuals are left-handed, while the great majority of men are right-handed. The analogy between the right arm and the muscular organs of speech does not seem to us very strong. Men educate their right arm for some purposes more carefully than the left;

but this is in actions which are habitually done in one arm only. To call the right the driving side seems an unfortunate expression, since the bridle arm is on the left side. The specialization of function on either side diminishes as the double organs act in common. This is seen in the legs as compared with the arms, and when we come to the organs of articulation, such as the lips and tongue, we cannot put in exercise the one side without also using the other; hence it seems to us difficult to admit that the memory of acts performed by muscles of two sides should lie only on one side. The analogy of paralysis of the right arm, such as it is, would only lead us to conclude that the act of speech should be rendered more difficult, not that it should be altogether impossible. We imagine that those who have, with so much labor, accumulated observations to show that the faculty of speech lies in the inferior frontal convolution, whether on the right or left side, will be by no means inclined quietly to allow Dr. Ferrier to shift the speech-centre into the operculum—a tract of brain not very far off, but quite distinct and easily distinguishable.

Palsy of the Larynx.—At the meeting of the Royal Med. and Chir. Society, Dec. 8, 1874, Dr. George Johnson read a paper on the laryngeal symptoms which result from the pressure of aneurismal and other tumors on the vagus and recurrent nerves. The principal object of the paper was to demonstrate and explain the fact that bilateral spasm and bilateral palsy of the larynx may result from the pressure of an aneurism or other tumor on the vagus nerve of one side only. We copy the following from the editorial comments of the number of the *Brit. Med. Journal* which contained the abstract of Dr. Johnson's paper:

The paper is a practical outcome of careful laryngoscopic examination in two cases of aneurism. In a case of aneurism of the innominata, with pressure on the right vagus and recurrent, Dr. Baumler had observed palsy of the larynx, and Dr. Johnson observed the same phenomena with an aneurism of the aorta pressing on the left vagus and recurrent. The question then arose, what is the explanation of the bilateral palsy of the larynx which results from pressure on the vagus and recurrent nerve on one side only? Dr. Johnson answers this question by suggesting that, while the palsy on the one side is a direct result of pressure on the recurrent nerve, that on the opposite side is due to an influence propagated through the afferent fibres of the compressed and irritated vagus to the nervous centre, and thence through the efferent fibres of the other vagus to the muscles of the larynx on that side; so that, in accordance with this view, while the palsy on one side of the larynx is a direct result of pressure on the recurrent, that on the opposite side is an indirect result of irritation of one vagus transmitted to its centre of origin, and thence reflected through the associated vagus to the muscles on the opposite side of the larynx. The arguments in support of this explanation will be found in the abstract of Dr. Johnson's paper, which we publish elsewhere, and it will be seen that the results of experiments on living animals lend support to this theory. It is shown that irritation of the recurrent nerve excites movement of the vocal cord on the one side only, while an electrical stimulus applied to the central cord of the divided

superior laryngeal nerve excites a reflex bilateral spasm of the glottis. In short, while a stimulus applied to one efferent nerve excites unilateral contraction of the laryngeal muscles, the excitation of the afferent fibres of one vagus determines a reflex bilateral contraction. This, then, is the explanation of the bilateral *spasm* of the larynx which results from unilateral nervous irritation. In explanation of the bilateral *palsy* induced by the long-continued irritation of the trunk of one vagus, Dr. Johnson refers to the structural changes which Dr. Lockhart Clarke has demonstrated to occur in the spinal cord as a result of peripheral nervous irritation in cases of traumatic tetanus; and he suggests that in any future case that may occur in which a bilateral palsy of the glottls, revealed by laryngoscopic examination during life, is found associated with an aneurism pressing on the vagus and recurrent nerves of one side only, a careful microscopic scrutiny of the medulla oblongata will probably discover, in the nerve-nuclei and the commissural fibres of the spinal accessory and the vagi nerves, structural changes which will fully explain the bilateral palsy, and thus supply the only evidence which is wanting to establish the truth of the theory.

High Bodily Temperature from Injury to Spine.—At the meeting of the Clinical Society of London, Feb. 26 (reported in *Brit. Med. Journal*, March 6), Mr. J. W. Teale read the notes of a case of supposed inflammation of the spinal ligaments, and possibly of the membranes, in which the temperature for weeks continuously ranged at 110° and upward, and five times the index was buried in the bulb at the top, indicating over 122°, the extreme height of the scale. Seven different instruments were employed, only one of which, however, registered the highest temperatures, the others reading only to 118°. These high temperatures were not uniform over the body, a difference of several degrees frequently existing between the temperature of the axilla and the thighs, and sometimes when the readings here were highest, the hands, feet and forehead were icy cold. After seven weeks of temperature never below 108° and rarely under 110°, it gradually returned to the normal figure. After five weeks' convalescence, however, a relapse followed the imprudence of a railroad journey of one hundred miles, but at the date of the report the patient was again slowly recovering.

The interest of this case is evident; it is altogether without parallel in medical records. The only way to account for the phenomena, and which is supported by some of the facts, seems to be to suppose, as is suggested in a leader of a subsequent number of the *Brit. Med. Journal*, local vaso-motor disturbance of the limbs, not extending to the centres.

The following are a few of the recent papers in this department. Some of them will be analyzed in the next issue of the Journal:

Erb, Rheumatic Facial Paralysis, *Deutsche Archiv f. Klin. Medicin*, XV. Bd., 1. Heft, p. 6; Heumann, Three Cases of Spinal Disease from Disorders of the Kidneys, *Ibid*, p. 101; Hertzka, Local Softening in the Gyrus Postfrontalis, a contribution to the literature of the localization of the cerebral functions, *Ibid*, p. 112; Demme, On the Nature and Treatment of Chronic

Eclampsia and Epilepsy in Childhood, *Jahrb. f. Kinderheilk.*, VIII., Heft 2, 113; STEINER, On the Night Terrors of Children, *Ibid*, 153; BOUCHARDAT, The Disorders of Innervation in Diabetes, *Bull. Gen. de Therap.*, Feb. 28, 145; CECCHERELLI, Contribution to our Knowledge of Inflammatory Alterations of the Brain, *Stricker's Jahrb.*, 1874, 3 and 4 Heft, 343; BIZZOZERO and BOZZOLO, On Primitive Tumors of the Dura Mater, *Ibid*, 284; A. McL. HAMILTON, The Microscopic Appearances of Degenerate Nerve Tissue, *Med. and Surg. Reporter*, March 27; J. B. HAMILTON, Cerebro-Spinal Fever, *N. Y. Med. Jour.*, Feb.; MILLS, Clinical Notes on Forty Cases of Chorea, *Phil. Med. Times*, March 27; GRABHAM, Remarks on the Origin, Varieties, and Termination of Idiocy, *Brit. Med. Jour.*, Jan. 16; LEE and CLAPPERTON, Maternal Impressions, *Ibid*, Feb. 6; CORMACK, Diphtheritic Paralysis, *Ibid* (cont. article); ADLER, Some Pathological Alterations in the Brains of the Insane, *Archiv f. Psychiatrie*, vol. II., 347; WIESINGER, On Cyst Formation in the Cerebral Cortex, *Ibid*, 379; SAMT, Epileptic Insanity, *Ibid*, 393; FUERSTNER, The Psychoses of Pregnancy and the Puerperal Condition, *Ibid*, 505; BASTIAN, Clinical Lectures on the Common Forms of Paralysis from Brain Disease, *Lancet* (cont. articles); HUGHLINGS JACKSON, Nervous Symptoms in Cases of Congenital Syphilis, *Jour. of Mental Science*, Jan., 1875; ROBERTSON, On Graves' Disease with Insanity, *Ibid;* THOMPSON, On the Physiology of General Paralysis of the Insane and Epilepsy, *Ibid;* ANDERSON, Clinical Lecture on Cases Illustrative of Gastric and Cerebral Vomiting, *Lancet*, Jan.; BROWN-SEQUARD, On the Hereditary Transmission of effects of certain Injuries to the Nervous System, *Lancet*, March.

---

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

ANTAGONISM OF REMEDIES.—The following are the general results of the experiments on the antagonism of remedies, by the Committee of the British Medical Association, as reported by Dr. J. Hughes Bennett, in the *British Medical Journal*, and additional to those given in our January number:

The Antagonism between Extract of Calabar Bean and Strychnine.—In this investigation, thirty experiments were performed.

Although the symptoms produced by either substance were modified considerably by the action of the other, there was no instance of recovery from a fatal dose.

The Antagonism between Bromal Hydrate and Atropia.—In this investigation, thirty-six experiments were performed.

1. There is a distinct physiological antagonism between bromal hydrate and atropine.

2. After a fatal dose of bromal hydrate, the introduction of atropia arrests excessive secretion from the salivary glands and mucous surfaces of the lungs, and thus obviates the tendency to death from asphyxia, caused by the accumulation of fluids in the air passages. Atropia also causes contraction of the blood-vessels, and thus antagonizes the action of bromal hydrate, which causes dilatation of these vessels by paralysis of the sympathetic nerve.

3. While atropia may save life after a fatal dose of bromal hydrate, the converse apparently does not hold good, as we have never succeeded in saving life after a fatal dose of atropia by the subsequent injection of bromal hydrate.

Influence of the External Use of Water on the Vessels of the Brain.—Dr. Max Schueller, *Deutsches Archiv f. Klin. Medicine*, XL., 5 and 6 Heft, p. 567, details in a rather lengthy paper the results of experiments on animals (rabbits), as to the action of external applications of water on the vessels of the pia mater. A large number of experiments were performed with each form of the application of water, the arteries of the brain were observed by trepanning the skull, generally on both sides, the dura mater being in most cases intact. The applications made were extremely diverse: pieces of ice applied to the head, cold and warm compresses, baths, cold and warm, douches, wet packs, injections, and simple wet rubbing of the surface, all were employed. Part of the animals operated upon were first curarized, and part had the vagi cut, without materially altering the results as far as concerned the condition of the cerebral vessels. The section of the cord at the second cervical vertebra, however, caused a general dilatation of the vessels of the pia mater, which afterwards remained unaffected by the water applications. The following were the general results of the different forms of application:

Ice applied to the head, caused on the sound side (sympathetic intact) a decided narrowing of the calibre of the vessels; on the side with the sympathetic cut, this result was hardly noticeable, and only appeared in a slight degree after the application had been made for some time.

A moist cold compress on the back or abdomen, caused, almost without exception, an immediate and lasting dilatation of the arteries on the sound side. On the side where the sympathetic had been cut, the vessels in most cases remained unaltered. A warm wet compress, in almost every instance, had the opposite effect—a more or less energetic contraction of the arteries and veins. If the compress was very hot, there was often a dilatation in the beginning. On the side of the severed sympathetic, the same appearances were observed in a much less degree. As the warm compress cooled, a dilatation always appeared, which was increased by the subsequent application of a cold compress. The same followed the removal of the warm compress, but only temporarily.

Full baths gave generally, analogous, but more intense effects. After cold immersion followed a dilatation; the greater in proportion to the extent of the immersed portion of the body. After long immersion, apparently from the cooling of the blood, the vessels again became narrow. After the ending

of the experiment, the calibre of the vessels became narrow, and a considerable reduction of temperature followed, the animals shivering in spite of the application of external heat. This reaction lasted in some cases a full half hour.

Warm immersion, after a transient dilatation, caused a considerable narrowing of the vessels. If very hot, the dilatation lasted for a longer time. After the warm bath, a temporary dilatation followed, increased by the subsequent application of cold water.

On the side where the sympathetic had been cut, the effects of warm and cold baths were slightly less pronounced.

The cold douche on the back or belly, produced alternating changes in the calibre of the vessels, and afterwards dilatation; the warm douche also caused the alternating changes of calibre.

Cold and warm injections into the rectum were followed by dilatation of the vessels.

The moist pack produced first a transient dilatation of the vessels, followed by a gradual and considerable narrowing of their calibre, lasting an hour or more, with slowing of the pulse and respiration, and diminution of the temperature and reflex excitability. On the animal's removal from the pack, the conditions quickly became again normal.

Cold or warm frictions with moist cloths, caused generally a contraction of the cerebral vessels. The same effect, but in a less degree, was observed with the use of a dry cloth.

After a rather lengthy discussion of the physiological conditions observed in the experiments, the author offers the following practical conclusions:

1. The effects of the different kinds of water applications on the organism, and especially on the vessels of the pia mater, as determined on animals, are likewise valid in the human subject. They depend on similar physiological conditions.

2. The various applications of water are useful in certain disorders of the brain, especially in abnormal conditions of the blood and lymph contents, and of the vessels themselves, as well as also in certain functional alterations of the nervous elements.

3. The special, practical value in these disorders, is grounded on the following results:

a. Restitution of the normal *tonus* of the vessels (especially those of the brain).

b. Production of normal conditions in the blood and lymph circulation in the brain.

c. Reduction of the congestion of the brain.

d. Restitution of the normal nutrition of the nerve elements.

e. Restitution of the normal reflex relations of the cutaneous nerves with the cerebral centres.

4. The practical employment of particular kinds of baths must be regulated not merely on the foregoing indications, but also on the actual soundness of the organs and the individual idiosyncrasies.

5. Curative applications of water are possible, on the ground of the above experimental results, in the following disorders of the brain:

a. Anæmia.

b. Arterial, or venous hyperæmia.

c. Mental exhaustion.

d. Nervous sleeplessness.

e. Febrile sleeplessness.

6. In cases of insanity, a systematic hydrotherapy is *not* practicable; but certain symptoms under particular conditions, may be relieved by some kinds of water applications.

Lobelina.—Dr. J. Ott, of Easton, Pa., gives, in the *Boston Med. and Surg. Jour.*, Feb. 4, an account of experiments performed on rabbits in Prof. Bowditch's laboratory, at Boston. The carotid artery was the one chosen for observation. The poison was injected into the jugular vein. In order to prevent struggling, all the rabbits but one were curarized, and automatic apparatus was employed to register the pressure and the pulse.

In the first experiments the vagi were cut after the administration of the poison, but the rise of the pressure was the same as before; hence it was assumed that the poison did not act on the inhibitory centres. Next the vagi were paralyzed by atropia, and the rise of pressure noted, and then nicotine was injected, after which no rise of any importance was observed. Then all the cervical cardiac nerves were divided, and section of the cord between the occiput and the atlas was practiced, before the injection of lobelina, which was then performed, and a very notable rise of pressure was seen. This action after the separation from the vaso-motor centre in the medulla, together with the observation of the action of nicotine, which, according to Rosenthal, paralyzes the vessels, caused a suspicion that lobelina acts directly on the peripheral vaso-motor apparatus. To test this, another experiment was performed. Nitrite of amyl, which paralyzes this apparatus, was administered to a curarized rabbit, and lobelina was then injected. As was expected, the rise of pressure was very slight.

Dr. Ott adds to this an account of two experiments with the aqueous extract of lobelia, performed on a dog and a cat, which are confirmatory of those on rabbits.

The opinions at which the author arrives from these experiments are, that lobelina in small doses reduces the blood pressure by acting on the peripheral vaso-motor system. It seems, also, that it temporarily reduces and then increases the pulse; but the limited number of experiments does not justify any more general conclusions. He adds, however, that he has found lobelina to be mainly a respiratory poison, and that in cats it greatly reduces the temperature.

Bromide of Potassium.—Dr. Danton (*Thesis de Paris*, 426, 1874,) has based his memoir on the lectures and experiments of Prof. Germain See, who, adopting the views of Binz, places the bromide of potassium among the drugs that affect the vascular system, and by the side of ergot and nicotine. Then M. Danton says:

"The bromide of potassium acts especially as a vascular medicament. In all the diseases that we consider to be caused by an abnormal action of

the cord or brain, it produces effects only by diminishing the excito-motor power and the reflex action of the nervous centres. It produces this effect only because it acts on the unstriped fibres of the vessels, as it causes a local anæmia, and thus destroys a greater or lesser excitation resulting from a temporary or permanent congestion. Moreover, the action of the bromide of potassium in epilepsy is to-day well proved and demonstrated. But it is especially in the cardiac affections that it is called on to be of the greatest service."—*Bull. Gen. de Therapeutique*, Jan. 30.

Ipecacuanha.—Dr. Polichronic has carried out, in the laboratory of Prof. Vulpian, a very interesting series of researches on the action of ipecacuanha and emetine. His clinical observations confirm the views of M. Chouppe. The following are the conclusions in full of the remarkable memoir of M. Polichronic:

1. Emetine is the true active principle of ipecacuanha. All the physiological, therapeutical and toxic properties of this plant are due to the presence of its alkaloid.

2. In dysentery, as well as in diarrhœa, ipecac given in injections is as energetic as when administered by the mouth, according to the Brazilian method.

3. Ipecac in injections is one of the best methods of treatment we can employ in cholera infantum, and can be carried on for a considerable time without enfeebling the child.

4. In the diarrhœa of tuberculosis, in all stages of the disease, ipecac in injection likewise gives good results.

5. This medication may be employed, also, with advantage to combat the exhausting sweats of phthisis.

6. Emetine is a violent poison and may destroy life in two ways: either by the nervous prostration it induces, or, when given in smaller doses, by the intense enteritis it provokes.

7. Two hypotheses are possible to explain the favorable action of ipecacuanha in diarrhœa:

(*a*) A vaso-constrictive action, diminishing the abundance of the secretions.

(*b*) A substitutive action, resulting from the inflammation of the mucous surfaces.

8. The vaso-constrictive action does not exist, as is shown by experiments on the nerve of the submaxillary gland and on the arterial tension.

9. The production of the inflammation of the gastro-intestinal mucous membranes, its prolonged duration after producing vomiting, seem, on the other hand, to plead in favor of the second hypothesis.

10. Emetine produces vomiting at the moment it is eliminated by the gastric mucous membranes, as is shown by the delay of the vomiting, and even more frequently its entire absence after the section of the two vagus nerves; in this it acts quite differently from apomorphine and tartar emetic. These two substances can, in fact, cause vomiting as well after as before the division of these nerves.

11. The physiological and chemical researches of this drug also support the view that emetine is eliminated by the gastro-intestinal mucous membrane.

12. Emetine does not possess a direct emetic action on the central nervous system, as has been proven by its injection directly into the cerebral arteries.

13. From this we may infer that in diarrhœa the emetine acts by substituting a simple inflammatory action for the pathological inflammation; its effects in these conditions are comparable in all respects with those of purgatives or nitrate of silver.

14. In the sweats we cannot infer any vaso-motor action, and are compelled to believe that in being eliminated by the sudoriparous glands, it tends to interrupt their secretion, or rather that it acts by the revolution that it produces in the digestive tube.—(*Thesis de Paris*) *Bull. Gen. de Therapeutique.*

Apomorphine.—C. David, C. R. Acad. Sci. (abstracted in *Rev. des Sci. Med.*) Apomorphine produces its emetic effect in doses of from ½ to 2 milligrammes, in the dog, and from 3 to 4 milligrammes (=about .04 to .06 grs.) in man.

Chloral injected into the veins suspends absolutely the action of apomorphine; chloroform only retards it. Morphia also prevents this action from being produced. The use of apomorphine is then not indicated in cases of poisoning by morphine.

The section of the vagi has no influence on the action of apomorphine.

A superoxygenated atmosphere suspends the action of apomorphine.

Finally, M. David noticed an excitant action produced by apomorphine that he verified on various animals; this action is never due to the nausea.

Valerianate of Caffeine in Obstinate Emesis.—In a recent thesis, M. Paret has recommended the employment of valerianate of caffeine in cases of persistent vomiting. M. Gubler has tested this drug and determined its efficiency in the nervous vomiting of hysterical females. He administered it in *dragees* of 1.5 grains each, to the number of six or eight in the twenty-four hours. This medicine has failed in tuberculosis. Will it also succeed in the pregnant female? M. Gubler does not say, and it is yet to be tried.—(Soc. de Therapeutique) *Gaz. Med. de Paris*, No. 2.

Laudanin.—This alkaloid of opium, also known as porphyroxin, has been investigated by Dr. Falck, of Marburg, and the results given in the *Deutsche Klinik.* The following summary of its toxic action is contained in his concluding paragraphs:

As regards a theory of laudanin poisoning there can be no difficulty. The alkaloid, introduced into the cellular tissue, is absorbed, enters the blood, is carried throughout the body, and thus comes in contact with the nerves. On the cardiac nerves it acts more slowly than on other parts, and the activity of the heart is affected much later than the nervous system generally. The alkaloid acts first and most noticeably on the centre for respiration,

causing accelerated breathing, respiratory agitation, cessation, inhibition, and paralysis. The poison also acts on the vaso-motor centre, causing vascular cramp and diminution of the blood supply, and after its paralytic action is developed, dilatation of the vessels, increase of blood supply, and heightened temperature. The most important effect, however, is the production of tetaniform convulsions. These are not difficult of explanation—they undoubtedly are connected with the respiratory agitation. Animals under the influence of large doses of laudanin, die from the brain outwards—the heart losing its vitality last of all. Taking all the symptoms, it acts very similarly to brucine and strychnine, and, like them, is to be considered as a tetanizing agent.

The Mode of Action of Emetics.—At the session of the Soc. de Biologie, Dec. 26, 1874 (reported in *Gaz. Med. de Paris*), M. Chouppe communicated the following note:

Last July I had the honor to present to the Society the results of some experiments proving that ipecacuanha, apomorphia, and tartar emetic, had not the same mode of action. Since I isolated the gastric mucous membrane by cutting the two pneumogastrics in the neck, I had some apprehensions that it might be objected that my demonstration was insufficient, and that the sympathetic fibres, or the anastomoses received below by the vagi, were sufficient to re-establish the nervous communications.

In order to meet this objection, I resolved to completely destroy the gastric mucous membrane. For this end I removed, in the labratory of Prof. Vulpian, the stomachs of numerous dogs; I not only took away this viscus, but also the abdominal portion of the œsophagus and the upper part of the duodenum.

I have introduced into the general circulation of the dogs thus operated upon emetic doses of emetine and apomorphine (I did not employ tartar emetic, since the classic researches of Magendie irrefutably showed that dogs vomited readily, after total ablation of the stomach, when this substance was injected into the veins). These experiments gave me results identical with those obtained after simple section of the pneumogastric; *i. e.*, after the injection of apomorphine the animals made numerous and violent attempts at vomiting, as numerous and prolonged as if they had not undergone any operation whatever. With emetine, on the other hand, this did not take place. It is therefore a new proof, supporting what I have said before, that apomorphine acts directly on the medulla, while emetine only causes emesis by acting on the gastric terminations of the pneumogastrics at the time when it is eliminated by the glands of the stomach.

These researches have suggested to me an idea, which I offer here under all reserve, namely, that this so neatly localized action of emetine may, perhaps, serve to determine the exact *role* and the distribution of the various filaments of the pneumogastric that go to the stomach and the anastomoses they receive. Also, by successive sections, performed while the animal is still living, we may learn whether the pneumogastrics, when destroyed, can be substituted by other nerves. I have already made preparations for some experiments in this direction, and propose to commence them immediately.

Nitrous Oxide.—The following are the conclusions of a memoir (*Thesis de Paris*) by Dr. Tony Blanche, as abstracted in the *Bull. Gen. de Therapeutique*, Jan. 30:

1. "Protoxide of nitrogen, chemically pure, cannot support respiration in animals any more than in vegetables; the combustion, in which respiration consists, not being sufficiently energetic to decompose the gas.

2. "Pure nitrous oxide, when breathed in a pure state by animals, is, therefore, an asphyxiant, causing death by producing all the general signs of asphyxia by strangulation, or by the respiration of inert gases (hydrogen, nitrogen).

3. "If nitrous oxide, respired pure, produces anæsthesia, it does so only as an asphyxiant which causes it by depriving the blood of its oxygen. Anæsthesia does not begin until the proportion of oxygen in the arterial blood is as low as two or three per cent. The blood is then quite black.

4. "Animals can survive, on the other hand, while breathing an artificial atmosphere of nitrous oxide and oxygen in the proportion of the common air, the nitrous oxygen replacing the nitrogen without showing any disturbance of sensibility.

5. "Nitrous oxide seems, nevertheless, to exert an ill-defined action on the brain, somewhat similar to that caused by the diminution of oxygen, and not leading to loss of sensibility.

6. "Nitrous oxide being an irrespirable gas, of which the preparation presents certain difficulties, only producing anæsthesia from the asphyxia it induces, its employment having also caused death in several cases, we consider that its usage should, if not given up altogether, be at least very limited in medical practice."

Croton Chloral.—The following, from Dr. Bouchut, is published in the *Gaz. des Hopitaux*, Dec. 5, 1874:

Croton chloral, of which we have recently spoken, has not all the properties of chloral, and does not, as it appears to me, replace it. First of all, the hydrate of chloral has not the same action in the adult and in the infant.

In the adult, chloral is hypnotic; it benumbs, but does not produce anæsthesia, at least not in the doses usually given by the mouth. Its taste is so acrid that the dose cannot exceed 6 to 8 grammes (=90 to 120 grs.), and the stomach revolts at that quantity. But with this amount we do not obtain absolute insensibility.

The case is different with children, in whom the stomach is more tolerant of the remedy, and complete anæsthesia is obtained with 3 or 4 grammes (=45 to 60 grs.).

The insensibility is such that abscesses may be opened and teeth extracted without pain. In my ward a child takes chloral at 8 o'clock, the dentist comes at nine and extracts the tooth, and it wakes three hours later, unconscious of the operation that has been performed. Some hundreds of cases of the employment of chloral have confirmed these facts to all who have followed my service.

Croton chloral, with which I have made some twenty experiments, seems

to me to have just one advantage over chloral: its taste is less acrid and disagreeable.

For such persons as wish only to sleep, it may be used; but when anæsthesia is required, it should be laid aside. In equal doses, croton chloral is inferior to and less active than chloral.

With 1 gramme (= 15 grs.): three experiments; twice no effect, once a short and light slumber. With 2 grammes: four experiments, and after half an hour, three times a light slumber lasting two hours, and no anæsthesia. In the fourth experiment there followed sleep and a semi-anæsthesia. With 3 grammes: eight experiments, in which there was sleep of three or four hours and a semi-anæsthesia in six cases, and in the other two no anæsthesia whatever. With 4 grammes: five experiments, one of which failed, the medicine not having been taken. In the four other experiments, the administration of 4 grammes caused once sleep with anæsthesia; but I have reason in this case to suspect some simulation on the part of the patient. In a second subject a semi-dormant condition and no anæsthesia. In a third, sleep lasting three hours and anæsthesia; and finally, in a fourth, sleep of three hours and a semi-anæsthesia. In all, the medicine was taken readily, and caused neither vomiting nor diarrhœa.

In view of these results obtained with croton chloral, it appeared to be worthy of notice to see what the action of chloral would be on the same subjects. As all suffered from the choreic affections in which I have found this agent so serviceable, the test was easily made.

I gave, therefore, 3 grammes of chloral each to seven patients. In five there was a profound sleep, a great relaxation of the limbs, and a chirurgical anæsthesia sufficient to permit the opening of an abscess or the extraction of a tooth without pain. In the two other cases there was sleep lasting three hours and a half, and scarcely any anæsthesia.

The patient who in this case felt no anæsthetic action of the chloral, was the same that with 4 grammes of croton chloral had but little sleep and no anæsthesia.

In fine, croton chloral has the same powers as chloral, but to a lesser degree. It produces sleep, and may be used when we have reason to fear the irritative action of chloral on the stomach. But if we wish to carry the effect to the point of anæsthesia, the action of chloral is more sure, and it is certainly more to be depended upon.

Intensity of the Action of Drugs according to the Weight of the Animal.—At the session of the Soc. de Biologie, Dec. 19 (reported in the *Gaz. Med. de Paris*), M. Coudereau presented a report of his experiments undertaken to ascertain the ratio between the dose of a medicament and the increase or diminution in weight of the animal experimented upon. He used in these researches rabbits, Guinea pigs, dogs and cats, and the agent employed was a solution of chloral in essence of mint. The conclusions he attained were as follows:

The solution of chloral in essence of mint, employed in doses proportional to the weight of the animal, seems to act:

1st. In the rodents, with an intensity *inversely* proportional to the increase of weight of the animal experimented upon.

2d. In the carnivora, with an intensity *directly* proportional to the increase of weight of the animal.

3d. The dose varies in each species.

4th. When the experimenters have determined the dose of any active substance, it is advisable to examine whether the intensity of its action is not directly or inversely proportional to the weight in the species of animal that is the subject of experiment.

The majority of these experiments were performed at the laboratory of Prof. Beclard, with the collaboration of M. Laborde.

In the discussion of the paper of M. Coudereau, M. Bert observed that, in his opinion, the experiments could not be taken as conclusive, partly because they were opposed to the results of previous researches, and partly because the experiments were not sufficiently numerous; moreover, the phenomena of sleep produced by two associated agents like chloral and essence of mint, did not appear to him sufficiently precise to allow of any extended generalization. M. Rabuteau also observed that the phenomena produced by chloral were complex, it acting both as chloral and chloroform; the mint might also have some influence.

M. Laborde defended the paper, claiming that the conditions of experimentation were very rigorous, and that they determined the sudden appearance of somnolence from chloral as readily as the convulsions from strychnia.

Action of Conicine on the Cutaneous Sensibility.—At the meeting of the Soc. de Therapeutique, Jan. 13 (reported in *Bull. Gen. de Therap.*), M. Gubler stated first the facts which show that hemlock modifies the sensibility, and indicated in particular the well-known phenomena of the death of Socrates, and the observation of Hunter of a man who, having taken a large dose of the drug, lost the ability to feel with his fingers; and then he related a case of his own observation, in which this action on the sensibility was very evident. A lady had habitually used the fingers of the right hand to rub an ointment containing conia over a cancerous tumor of her husband. After a certain time the fingers that were used lost their sensibility, and the other hand, provided with a glove, was employed. In this case also the fingers became insensible. But these phenomena all disappeared after the cessation of the cause.

M. Gubler insisted upon the importance of this observation, as showing the reality of the modifications of the sensibility induced by conicine, a fact he had already dwelt upon in his *Commentaires de Therapeutique.*

The Action of Atropine and Muscarine on the Heart.—At the meeting of the Soc. de Biologie, Jan. 30, Dr. Alison, of Baccarat, read the following note, which we take from the *Gaz. Medicale de Paris*, Feb 20:

M. J. L. Prevost, of Geneva, showed to the Society, April 25, 1874 (see this journal July, 1874, p. 410—Eds.), that atropine (Schmiedeberg and Koppe),

digitaline (Bœhm) and calabar bean (Prevost) can make the contractions of the heart to re-appear when arrested by muscarine. The interest taken by the Society in that communication has induced me to offer one on the same subject. My experiments were performed on frogs, with the filtered juice or the extract obtained by slow decoction and filtration of the ammanita muscaria.

My object is to show:

1. That a large number of agents may, like atropine, digitaline or calabarine, revive the cardiac contractions arrested in diastole by the ammanita muscaria.

2. That among these, atropine possesses this quality in the highest degree.

3. And finally, that, whatever may be the conditions in which the diastolic arrest is obtained, these agents, and atropine in particular, can cause the heart to take on its former action.

I. The agents that can revive the contractions of the heart:

1. *Indirect Agents.*— Any irritation whatever, mechanical, chemical or galvanic, acting on peripheral nerve fibres or on the principal nervous trunks, the sciatic nerve, for example, when these organs, with the cord, have not yet lost their functions, may counteract the diastolic arrest from the ammanita muscaria.

We may add that the excitation produced by artificial respiration may arouse the contractions of the heart anew, even in cases where it is inefficient to arouse the hyoidean respiratory movements.

The re-establishment of the movements of the heart, by affecting the circulation of the nervous centres, may delay the moment of the disappearance of the vital phenomena. If we take two frogs, A and B, exactly similar in all respects, placed in the same conditions, and having received the same dose hypodermically, say 1-50 gramme of the filtered extract, and if we then leave the frog A perfectly quiet, while at the same time we excite the other one by pinching, etc., we will find that the voluntary hyoidean movements disappear simultaneously in each, but the more marked reflex phenomena and the apparently voluntary movements will continue for a considerable period (from some hours to several days) in the frog B, after they have entirely ceased in the other.

2. *Direct Agents.*—These are very numerous; the following are the principal ones:

a. Air.—A current of fresh air, the *souffle* of respiration, may, a short time after the arrest of the heart, bring it again into action (hence the precautions needful to ascertain if it be really stopped or not).

b. Light.—A bright light, such as that from a window or candle near by, exercises a notable effect on the contractions of the heart arrested in diastole by the ammanita muscaria. If the arrest is very recent, a bright light readily produces fresh contractions. If the heart has been stopped for some hours, the reflex phenomena abolished (to the excitation by pinching), the contractions may be produced. In cases even where they do not re-appear, the arrest being of too long standing, the heart, held a short distance from a candle, begins to swell, and from being black becomes gradually more red and smaller, and the surface of the ventricle takes on an irregular appearance.

Generally, in a frog under the influence of a solution of 1 gramme .50 to a quart of extract of ammanita muscaria, the heart being arrested some two or three hours, the reflex phenomena are nearly *nul.*

The following facts were demonstrated :

1. The whole frog being covered with a piece of black taffeta, or the heart alone being covered, the contractions of the heart did not re-appear.

2. The heart alone being uncovered and placed a little distance from a lighted candle, evident contractions, both partial and general were soon observed.

c. Air and acidulated water can alike at once produce contractions of the arrested organ.

d. A solution of nux vomica of the strength of 1–100.

e. A solution of tobacco (2 grammes of the dried leaves of the year in infusion with 50 grammes of water) possessed the same properties.

f. Digitaline.—A solution (1–100) of digitaline also causes the heart arrested in diastole to again contract. These contractions are, nevertheless, generally feeble, partial and irregular.

g. Calabar Bean (Solution of 1–50 of the extract).—We have seen the contractions aroused by calabar bean last more than two days ; the solution was applied before the reflex movements had altogether ceased. If, however, the arrest has continued for a long time, the re-appearance of the heart's movements is uncertain.

h. Atropine (Solution 1–100). — Atropine can relieve the arrest of the heart after it has lasted for a period varying from a few hours to a day or more. The contractions it induces are strong, generalized, and may continue twenty-four to forty-eight hours or even longer.

i. We need scarcely say that direct mechanical irritations (such as pinching) of the cardiac substance will also produce contractions. We may add that caffeine, ergotine, curare, morphine, chloral, and hyoscyamine seem to have but a slight action on the muscarinized heart.

II. Which one, among all the agents, possesses in the highest degree the power of causing the arrested contractions of the heart to re-appear ? To answer this question we have : *a*, employed each of the agents mentioned on many hearts arrested in diastole under the same conditions ; and *b*, employed many of these agents successively on the same heart so arrested.

(*Note.*—In order to determine accurately the degree of action of each of these agents, it is important to have an interval of an hour or more after each trial before employing a new agent.)

In these experiments we have varied as much as possible :

a. Everything relative to the subject in general, species, sex, strength, time of preservation in the laboratory.

b. Everything relative to the heart itself, the heart in general, the organ excised.

c. That which relates to the solution employed (of the strength of 1–100 in all cases), a solution affecting frogs in nearly a uniform time.

d. That which relates to the moment of action of the different agents.

From this comparative study it was found that the movements of the heart, due to the action of atropine have in general a greater intensity and duration than those due to other agents, and that as the indirect or direct

agents—air, acidulated water, solution of calabar bean, tobacco, morphine, chloral, and hyoscyamus—have or have not exhausted their activity, the 1–100 solution of atropine can still cause general contractions.

III. Conditions in which atropine causes the movements of the heart to re-appear.

So far we have sought to counteract the diastolic arrest of the heart caused by diffused action after subcutaneous injection. We may still cause the movements after the arrest by the same agents, and especially by atropine, under the following conditions:

1. After the local action of the filtered juice, or a solution of ammanita muscaria on the naked organ.

2. After the local action on the heart of a small piece, the size of a pea, of the extract laid directly on its surface.

3. After the local action on the uncovered heart, or the diffused action by subcutaneous injection in frogs that have previously undergone transverse section of the fibres above the medulla.

4. After local or diffused action of the drug in frogs in which a ligature was placed at the level of the upper part of the cord in such a way as to hinder the flow of blood, and followed by decapitation, the section passing below the rachidian bulb.

We consider these facts of importance, and insist on them when we study the action of ammanita muscaria on the heart.

We will remark before closing this subject that the muscarinized heart cannot contract of itself after its movements have ceased.

We have also seen:

1. In frogs poisoned by digitaline, that the cardiac movements recommenced and continued many hours from the application of a solution of ammanita muscaria.

2. In frogs poisoned by infusion of tobacco, the same result followed the application of a few drops of the ammanita muscaria solution.

3. In frogs poisoned by a solution of the extract of calabar bean, the heart that had ceased to beat for two hours, recommenced on the application of a few drops of acidulated water, and again, after a new arrest, from the action of the light of a candle.

4. Finally, in frogs poisoned by atropine or digitaline, the heart beats anew on being held near a lighted candle.

But in these conditions the new contractions of the heart are usually feeble, partial, of short duration, and in no way comparable to those produced on the muscarinized heart by the agents we have studied.

We think that we may therefore conclude:

1. That the heart arrested in diastole by ammanita muscaria possesses the capability of again readily renewing its action under the influence of a large number of agents.

2. That the neutral sulphate of atropine possesses in the highest degree this property of re exciting the heart to action.

Blepharospasm Cured by Morphia Introduced into the External Auditory Passages.—Dr. T. Rana, (*Il Morgagni Giornale,*) *Bull. Generale de*

Therapeutique, describes a case of chronic blepharospasm appearing whenever the patient performed the movements of mastication, lasting for many months. The patient had also previously suffered from a persistent trigeminal neuralgia of the same side. Examination showing no defect of the eye or conjunctiva, the doctor concluded that the symptom was of a reflex nature, and prescribed bromide of potassium and a regimen directed against cerebral congestion. The results of this treatment, as well as of the topical application of sedative ointments were alike negative. The application of the constant current afforded at first a slight relief, but subsequently was of no avail.

Following, however, a suggestion of Eulenburg, he next tried hypodermic injections of morphia, causing severe vomiting, but without satisfactory results. He then fell back on the bromide treatment and continued it twenty days, the disorder increasing in severity all the while. As a last resort, he prepared the following prescription, ten drops of which was introduced into the auditory meatus of the affected side morning and evening: Chlorate morphiæ, 3 grs; distilled water, ℨ iii.; glycerine, ℨ ii. After two days of this treatment, the patient passed a comfortable night, free from the troublesome spasms, and on awaking in the morning found that she could eat without its recurrence. In eleven days all traces of the trouble had disappeared, and had not at the end of seventeen months again made its appearance.

Electrization of the Heart.—M. Vulpian reported to the Soc. de Biologie, Dec. 19th (reported in *Le Progres Medical*), some experiments performed on dogs. He found that whenever a reaphore was applied to the ventricles of the heart, and a current of a certain intensity was passed into the cardiac substance, there followed a sort of cardiac convulsion, irregular contraction, and then arrest with the death of the animal. No attempts at resuscitation succeeded.

The importance of this fact, in the opinion of Prof. Vulpian, rested on the question of the practicability of re-exciting the pulsations in cases of accidents of anæsthesia, by electro-puncture of the heart. If the effect on man is the same as on the dog, this would appear to be a very dangerous proceeding. He, however, would not venture to say that the effects would be the same on other mammals and on man as on the dog. Still, the subject is worthy of the careful attention of physicians.

In a subsequent meeting, Dec. 26th, M. Carville communicated some further experiments of M. Vulpian, which proved that on cats the same effects were produced as on dogs by electrization of the heart, and that continuous as well as interrupted currents were effective.

Among others, we may enumerate the following as recent contributions to this department:

Brunton, Lectures on the Experimental Investigation of the Action of Medicines, *Brit. Med. Jour.*, Feb. 13; W. Berry, Alcohol as a Medicine, *Ibid*, Jan. 16; Rockwell, The Relation of Electro-Therapeutics to Electro-Physiology, *Med. Record*, Feb. 20; Wharton Sinkler, On the Treat-

ment of Neuralgia by the Constant Current, *Phil. Med. Times*, Jan. 30; Wood, On the Principles which Govern the Use of Electricity in Paralysis, *Ibid*, Jan. 2 and 16; Beard, Cases Illustrating Different Degrees of Susceptibility to Electricity, *Med. Record*, April 3; Schramm, On the Action of Nitrite of Amyl, Especially in Melancholia, *Archiv f. Psychiatrie*, vol. II., 317; W. A. T. Browne, Artificial Alimentation, *Am. Jour. of Insanity*, Jan., 1875; Siloman, Experience of Morphia Injections in the Insane, *Allg. Zeitschr. f. Psychiatrie*, XXXI., 6, 653

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Medicinische Central-Zeitung.
Allgemeine Zeitschrift fuer Psychiatrie und Psychisch. Gerichtl. Medicin.
Annales Medico-Pyschologiques.
Archiv fuer Anatomie, Physiologie, und Wissenschaftl. Medicin.
Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.
Archiv fuer die Gesammte Physiologie der Menschen und Thiere.
Archiv fuer Psychiatrie.
Archivio Italiano, per le Malattie Nervosi.
Berliner Klinische Wochenschrift.
British Medical Journal.
Bulletin Generale de Therapeutique.
Centralblatt f. d. Med. Wissenschaften.
Der Irrenfreund.
Deutsches Archiv f. Klinisches Medicin.
Deutsche Klinik.
Gazetta Frenocomia di Reggio.
Gazette Medicale de Paris.
Gazette Medicale de Bordeaux.
Gazette des Hopitaux.
Hygiea.
Hospitals Tidende.
Il Galvani.
Jahrbuch f. Kinderheilkunde u. Physische Erziehung.
Jahresbericht u. d. Leistungen u. Fortschritte in der Gesammt. Medicin.
Journal of Anatomy and Physiology.
Journal de l'Anatomie et de Physiologie, etc.
Journal de Medicine et de Chirurgie Pratiques.
Journal of Mental Science.
La France Medicale.
Le Progres Medical.
Lo Sperimentale.
L'Union Medicale.
Medicinische Jahrbuecher.
Psychiatrisches Centralblatt.
Rivista Clinica di Bologna.
Revista Sperimentale di Freniatria e de Medicina Legale,
Revue de Therapeutique.
Revue des Sciences Medicales,
Revue Scientifique,

Schmidt's Jahrbuecher der In- und Auslandischen Gesammten Medicin.
The Practitioner.
Vierteljahreschrift fuer die Prakt. Heilkunde.
Wiener Klinik.
Wiener Medicinische Press.
Zeitschrift f. Biologie.

The following domestic exchanges have been received:

American Journal of Insanity.
American Journal of Medical Sciences.
American Journal of Obstetrics.
American Journal of Pharmacy.
American Medical Weekly.
American Naturalist.
American Practitioner.
Atlanta Medical and Surgical Journal.
Boston Medical and Surgical Journal.
Canada Medical Record.
Chicago Medical Journal.
Clinic.
Cincinnati Lancet and Observer.
Detroit Review of Medicine and Pharmacy.
Indiana Journal of Medicine.
Medical Examiner.
Medical Herald.
Medical News and Library.
Medical Record.
Medical and Surgical Reporter.
Nashville Journal of Medicine.
New York Medical Journal.
Peninsular Journal of Medicine.
Pacific Medical and Surgical Journal.
Pharmacist.
Philadelphia Medical Times.
Physician and Surgeon.
Physician and Pharmacist.
Psychological and Medico-Legal Journal.
Richmond and Louisville Medical Journal.
Sanitarian.
St. Louis Medical and Surgical Journal.
Virginia Medical Monthly.

BOOKS, ETC., RECEIVED.

NOTE.—The foreign works in this list can be obtained through Messrs. B. Westermann & Co., 524 Broadway, New York.

Ueber die verschiedene Erregbarkeit functionell verschiedener Nervmuskel-apparate. Von Alex. Rollett. (Mit 3 Tafeln). Aus dem LXX. Band der Sitzb. der K. Akad. der Wissensch. III. Abth. Juni-Heft, Jahrg. 1874. 54 pages.

Near Sight treated by Atropia. With Tables. By Hasket Derby, M. D. New York, 1875. 8 pages.

Court of Common Pleas, Philadelphia. In Equity, Sellers et al. *vs.* the Penn. R. R. Company et al. Complainants' affidavits on Motion for Injunction to Restrain Erection of Slaughter Houses. 104 pages.

Lecons sur la Physiologie et l'Anatomie Comparee de l'Homme et des Animaux ; faites a la Faculte des Sciences de Paris, par H. Milne-Edwards. C$^{\underline{m}}$ L. H., C. O. M. P., etc. etc. Tome onzieme. Premiere Partie—Locomotion. Systeme Nerveux. Paris, 1874. 236 pages.

Die Anwendung der Elektricitaet bei Behandlung der Geisteskrankheiten. Eine von der Societe Medicale d'Anvers mit mention honorable und Diploma ausgezeichnete Preisschrift. Von Dr. Joh. Bap. Ullersperger. Muenchen, 1875. 51 pages.

Chicago Relief and Aid Society. Report of the Committee on Sick, Hospital and Sanitary Measures. (From the General Report of the Society.) 63 pages.

Les Fonctions Superieures du Systeme Nerveux. Recherche des conditions organiques, et dynamiques de la Pensee. Par Antoine Cros. Paris, 1875. 543 pages, Large 8vo.

Etudes sur la Physiologie par. F. Coyteux. Paris, 1875. 792 pages, Large 8vo.

Experimental Untersuchungen ueber das Schædelwachsthum. Von Dr. B. v. Gudden, K. Director der Oberbayerischen Kreisirrenanstalt, etc. Mit 11 Tafeln in Lichtdruck. Muenchen, 1874. 48 pages, 4to.

Report on General Paralysis to the Ohio State Medical Society, Toledo, O., 1874. By D. A. Morse, M. D., of London, Ohio. 120 pages, 8vo.

Die Heil und Pflegeanstalten fuer Psychisch-kranke in Deutschland, der Schweiz und der benachbarten Deutschen Laendern. Von Dr. Heinrich Laehr. Mit colorirter karte. Berlin, 1875. 183 pages, 8vo.

The Histology and Histo-chemistry of Man. A Treatise on the Elements of Composition and Structure of the Human Body. By Heinrich Frey, Professor of Medicine in Zurich. Translated from the Fourth German edition by Arthur E. J. Barker, and revised by the Author, with 608 Engravings on wood. New York, D. Appleton & Co, 1875. 683 pages. Large 8vo. Chicago, Hadley Bros.

Spinal Paralysis in Children and Adults. By E. C. Seguin, M. D. (Printed for private circulation only.) 8vo., 56 pages.

Des Maladies du Cerveau et de l'Innervation d'apres Auguste Comte. Par M. G. Audiffrent. Paris, 1874. 933 pages 8vo.

A practical Treatise of Medical and Surgical uses of Electricity, Including Localized and General Faradization ; Localized and General Galvanization ; Electrolysis and Galvano-Cautery. By Geo. M. Beard, A. M., M. D., and A. D. Rockwell, A. M., M. D. Second Edition, revised, enlarged and mostly re-written, with nearly two hundred illustrations. New York, 1875, Wm. Wood & Co. Chicago, Jansen, McClurg & Co.

The Legal Relations of Emotional Insanity. By E. Lloyd Howard, M. D., Baltimore, Md. Extract from the Tranactions of the American Medical Association. 12 pages.

A Consideration of Certain Symptoms associated with Morbid Changes in the Medulla Oblongata. By Allan McL. Hamilton, M. D. (From the Transactions of the New York Academy of Medicine, for January, 1875.) 15 pages.

Twentieth Annual Report of the Board of Trustees and officers of the Northern Ohio Hospital for the Insane, to the Governor of the State of Ohio, for the year 1874. Columbus, O., 1875. 51 pages.

Fourteenth Annual Report of the Trustees, Superintendent and Treasurer of the Illinois State Hospital for the Insane, at Jacksonville. December, A. D., 1874. Jacksonville, 1874. 48 pages.

Compendium of Children's Diseases. A Hand-book for Practitioners and Students. By. Dr. Johann Steiner. Translated from the Second German Edition by Lawson Tait, F. R. C. S. New York, 1875. D. Appleton & Co. 408 pages, 8vo. Chicago, Hadley Bros.

Handbuch der Speciellen Pathologie und Therapie. Herausgegeben von Dr. H. v. Ziemssen. Dritter Band : Chronische Infectionskrankheiten. 629 pages. Fuenfter Band : Krankheiten der Respirationsapparates, II. 684 pages. Siebenten Band. Erste Haelfte : Krankheiten des chylapoetischen Apparates, I. 323 pages.

Die Naturwissenschaftliche Methode in der Psychiatrie. Vortrage gehalten in der Berliner Medicinisch-psychologischen Gesellschaft, von Dr. Paul Samt. Berlin, 1874. 60 pages.

Cervello di Uoma mancante del Corpo Callosa, del Setto Lucido e della Grande Circonvoluzione cerebrale chiamato del Corpo Callosa, colla Integrita della Funzioni Intelletuali. Di Maliuvemi S. Germano. Con tre tavoli lithografiche. Torino, 1874. 21 pages.

In Sachen Darwin's insbesondere contra Wigand. Ein Beitrag zur Rechtfertigung und Fortbildung der Umwandlungslehre. Von Dr. Gustav Jaeger. Stuttgart, 1874. 264 pages.

Dictionnaire Encyclopedique des Sciences Medicales. Directeur, A'Dechambre. Premiere Serie, Tome Seizieme. Premiere partie, Chi-Chi. Paris, 1875. Deuxieme partie, Chi-Chi, Paris, 1875. Deuxieme Serie, Tome Neuvieme, Premiere Partie, Moe Mor, Paris, 1875. Troisieme Serie. Tome Deuxieme. Seconde partie, Rat-Red. Paris, 1875.

Annual Announcement of Lectures at Toland Hall, Medical Department of the University of California, San Francisco, Cal. Session of 1875.

Report of the Resident Physician of Brigham Hall, a Hospital for the Insane, for the year 1873. Canandaigua, N. Y., 1874. 8 pages.

The Relation of Electro-Therapentics to Electro-Physiology. By A. D. Rockwell, M. D. (Read before the N. Y. Society of Electrology and Neurology.) 11 pages.

THE

CHICAGO JOURNAL

OF

Nervous and Mental Disease.

Vol. II. JULY, 1875. No. 3.

Original Articles, Selections and Translations.

Art. I.—THE MOVEMENTS AND INNERVATION OF THE IRIS.

By Dr. H. Gradle, Chicago.

(*Continued from page* 221.)

II.

SINCE the first part of this paper has gone to press, we have obtained access to *Henle u. Pfeifer's Zeitschrift f. Rat. Med.*, including *Meissner's Jahresbericht der Physiologie*, a periodical very rich in the literature of our subject. From a fuller abstract in this paper of Balogh's investigation, (*Moleschott's Unters.*, VIII., s. 423) it appears that the animals employed by him were not after all—as had been supposed—dogs, but, on the contrary, rabbits. His assertion, therefore, that he found pupil-dilating fibres arising in the medulla, and passing in the trunk of the trigeminus, loses its apparent value, as it is a contradiction of the results of most other experimenters, especially Gruenhagen and Ragow (*Zeitschr. f. Rat. Med.*, 3te reihe, bd. XXIX., s.1.), who on using thesame excitor—asphyxia —obtained no dilatation whatever of the rabbit's pupil after destruction of the superior cervical ganglion. Balogh, as we remember, claimed to have seen a pupillary enlargement on stimulating the medulla. This Gruenhagen (*Zeitschr. f. Rat.*

Med., 3te reihe, bd. XXIX., s. 275) confirms, but on eliminating the influence of the sympathetic by its section in the neck, the latter observed *decided* contraction. Balogh also saw dilatation by irritating the *first* ophthalmic branch of the fifth nerve in (as he affirms) rapidly decapitated rabbits. A similar statement is made by Oehl (*Meissner's Jahresbericht*, 1862, s. 506), who, however, admits that on a rapidly exposed trigeminus, irritation *always* results in pupillary contraction in the rabbit, and that *only after exposure of the nerve to the air for some time, will stimulation or section of it enlarge* the size of the pupil. Is the inference, therefore, that the trigeminus, or *at least its pupil-constricting fibres*, has lost its irritability by this rough procedure, not justifiable? Yet Oehl claims that this constricting influence on the pupil is due to filaments in the trunk of the fifth nerve, and not to the sympathetic branches around it, as he proved by carefully-isolated galvanization—at least in the dog—and by the persistence of the phenomenon in rabbits after the sympathetic had lost its irritability by extirpation of the superior cervical ganglion. In a similar manner he believes himself to have demonstrated that the sympathetic fibres *do not enter at all the trunk of the fifth nerve.* As he could not find dilator fibres central to the Gasserian ganglion, he considers that body as a point of origin of pupil-dilating filaments. While, therefore, we cannot positively deny the existence of *dilator* fibres in the trigeminus trunk of the rabbit, it would be irrational to put too much faith in these isolated and contradictory observations.

We have yet to investigate the action of the ciliary ganglion. Brachet (*Syst. Nerveux Ganglionaire*), who first extirpated this ganglion, found complete paralysis of the iris resulting therefrom, with dilatation of the pupil in the dog. The same was obtained by Bernard on cutting the ciliary nerves; if he severed these filaments only on the outer side of the optic nerve, the corresponding half of the pupil was paralyzed, and, on contracting the sphincter iridis by light, only the inner segment of the pupillary circle was reduced in diameter, the outer half remaining dilated (*Syst. Nerveux*, t. II., p. 88). He therefore raises the question whether in animals with slit-shaped pupils the commissures of the sphincter are not devoid of ner-

vous supply? But the observation of Remak, that the cat's pupil will not become oval after section of the sympathetic, would rather speak for a stronger contraction of the dilator fibres parallel to the direction of the slit. Hensen and Voelkers also moved small segments of the iris by stimulating only one ciliary nerve. In rabbits the reverse takes place, section of the ciliary nerves contracting the pupil, and the same following their stimulation. In man the ciliary ganglion has been pricked with a needle, introduced through the sclerotic, by Serre d'Uzes (*Gaz. des Hop.*, Dec. 5, 1837, abstr. in Schmidt), with the result of contracting the atropinized pupil. These differences may receive the same explanation as the effects of the trigeminus on the filaments of which they probably depend, *i. e.*, be referred to the predominance of one muscle of the iris over the other in different species, or perhaps the greater influence of the ganglia of the iris on either muscle. For a confirmation of this view, one might be tempted to compare the irides of the different animals after death, when nervous influence has ceased, but, for various reasons, not much is to be gained from such an investigation. The pupil of the rabbit, whose sphincter iridis apparently predominates in life, contracts by decapitation or extirpation of the eye from irritation of the trigeminus fibres; yet it begins to dilate again soon after death, and though this dilatation is hastened by the instillation of atropine, it is not greater in the eye thus treated. The cat's eye, whose trigeminus cannot contract the pupil, is dilated at the moment of death, and even the contraction induced by calabar bean is overcome by death (Fraser). Bouchut (*Traite des Signes de la Mort*, p. 127) affirms that the human pupil contracts during the act of dying, dilating again after life is entirely gone, while Budge thinks that a *dilatation* occurring in the last moments of life is due to the greater irritability of the sympathetic system* after it is already much reduced in the motor oculi; in death, the pupil, according to him, is contracted—a statement also made by Ruete and others. Perhaps the question appears plainer on referring to the older observations of MacKenzie (*Lond. Med. Gaz.*, vol. I., Jan. 25, 1834), who observed some-

* In a similar way Schiff refers this dilatation to asphyxia, as an excitor of the sympathetic nerve.

times *contraction* and sometimes *the opposite state.* These differences are no doubt due partly to the manner of death and partly to the amount of light to which the iris was exposed before its irritability is lost, as the experiments of Brown-Sequard above cited (*vide* page 200) show; the same was also observed by Pokrowsky (*Virchow's Arch. f. Path. Anat.*, bd. XXX., s. 525) in poisoning by carbonic-monoxyd (CO) who saw the dilatation due to this toxic agent disappear in five to eight hours after death, if the eye *was exposed to light*, but not at all if it was left in darkness. All we can therefore conclude is, that in some animals (and in man), if muscular action does not come into play, the elastic traction of the tissue of the iris is set at rest by a (moderate?) dilatation of the pupil, which state seems to be normal to it when not affected by muscular activity. This is corroborated by the dilatation observed in young animals before the lids are open (Rouget, *Journal de la Phys.*, t. III., p. 569).

A marked contraction, however, is always noticeable in sleep, a fact that might be understood as putting the conditions of elasticity of the iris in another light; but this contraction certainly depends on other than the elastic properties of the iris. In hibernation, when vital faculties are almost entirely at rest, a dilatation does really occur. The contraction of the pupil in sleep was referred by J. Mueller to the sympathy between the internal rectus and the sphincter iridis, as the eye is mostly turned inward and upward, but this is not always the case, and besides the contraction occurs even in paralysis of the internal rectus, or its division for strabismus. Ruete (*Ophth.*, s. 97) seeks the cause in "a reduced sensibility of the nerves," as paralysis of the fifth nerve always leads to pupillary contraction, but this need not be refuted after our remarks on that nerve. Moreover, the action of light on the retina can be excluded, as Ruete saw even the amaurotic eye, wide in daylight, become contracted during sleep. We must therefore seek the source of the contraction in an exaggerated influence of the motor oculi, (which could be determined by observations in cases of paralysis of that nerve, of which I could find no record,) or with perhaps more show of probability, in an activity of the ganglia in the iris itself. This latter view is

only apparently, not really, contradicted by the fact that the atropinized pupil fails to contract during sleep.

In narcosis, also, is the contraction a prominent symptom, the pinhole pupil of opium-poisoning being a well-known fact. But only lately has much attention been bestowed upon the pupil in anæsthesia induced by the usual agents. Budin and Coyne, in their first article read before the Societe de Biologie (*Le Progres Med.*, Sept. 5, 1874), gave a very perfect description of chloroformization in dogs and man. During the stage of excitement, a transitory dilatation ensues with insensibility to light, but this passes gradually into contraction, and remains so during the entire period of anæsthesia, with complete immobility. This agrees perfectly with the statements of Perrin (article, "Anæsthesia," *Dict. Encycl. d. Sc. Med.*), one of our best authorities. But if, before sensibility is entirely destroyed, any impression, however slight, as the prick of a pin (I have observed the same also on pressing the hand), is made on the body, the pupil immediately dilates, to an extent varying with the intensity of the impression, even to its maximum. This is soon followed by other signs of returning sensibility, as struggling, etc. Only after all reaction on the part of the pupil has ceased can the anæsthesia be considered complete.

A sudden dilatation in such profound narcosis, if not the result of returning sensibility, was found to be the precursor of death—by asphyxia? If attempts at vomiting occur, they are at once indicated by a considerable dilatation of the pupil and the speedy return of sensibility. The pupil thus constitutes a most delicate index of the state of sensibility in anæsthesia; a true æsthesiometer, in the words of Schiff and Foa, who confirmed these results in the main—its contraction, or more properly, its immobility in that state, being an absolute sign of the loss of sensibility. The priority of announcement of this fact, we are forced, however, to ascribe to Westphal ("Ueber die Pupillenphenom. in der Chloroformnarkose," 1862, *Virch. Arch.*, bd. XXVII., s. 409, et seq.), who makes the very same statements. The dilatation indicative of a sensory impression, he produced even by shouting into the ear of the patient. In two cases — anæmia and cachexia, disorders

frequently accompanied by pupillary dilatation—a contraction during complete narcosis failed to occur, though the pupil remained immovable. The same was also found in an habitual drunkard by Budin and Coyne (loc. cit.), who admit in a subsequent note to the Soc. de Biologie (Dec. 12, 1874), that the absolute size of the pupil varies in different persons in the contraction of complete anæsthesia.

In the progress of numerous instances of etherization, I have noticed the same phases of the pupil as above described. Chloral produces even a stronger contraction than chloroform, on account of a more absolute anæsthesia. Morphia also exercises the same marked influence on the pupil as the preceding anæsthetics. Dr. Vibert (*Journ. de Therap.*, Feb. 25, 1875) hence asserts, that he has used the size and mobility of the pupil as an index of the efficacy and indication for continuance of hypodermic injections of that alkaloid.

The rationalè of these phenomena is explained by the effects of these anæsthetics, which are, as we know, a diminution of the sensibility of the nerve centres. The stimulation of the optic nerve by light not being perceived any longer by the brain, the activity of the third nerve ceases, and dilatation of the pupil and immobility to light are the result. The centre of the *sympathetic* dilator fibres, however, succumbs later to the benumbing influence of the narcotics, a fact easily observable. The reflex impulses, therefore, sent from the seat of a sensory impression through the sympathetic to the radiating fibres of the iris, encounter no resisting contraction of the stronger sphincter muscle, since the motor oculi is inactive; hence the dilatation caused by pain is much more apparent than in the normal state. The action, at least of chloroform and ether, is not directly on the nerves themselves, since Dogiel (*Reichert's Arch. f. Anatomie*, 1866) found both the motor oculi and sympathetic responding to galvanism. If absolute immobility occurs during complete anæsthesia, it is owing to the fact that no reflex impulses are conveyed to these nerves; even in profound narcosis the excitant effects of asphyxia on the sympathetic are at once recognized by pupillary dilatation. All communication between both sets of muscular fibres of the iris and the nerve-centres having thus ceased, we should

expect the elasticity of the iris to leave the pupil in moderate dilatation; as a fact, however, strong contraction is observed. To refer the latter to the influence of the fifth nerve would be hazardous, as we do not know what could bring about excitation of that nerve; besides, the same contraction is observed in dogs, whose trigeminus possesses no pupil-constricting fibres. We are forced, therefore, to seek the cause of the contraction during anæsthesia in an activity of the ganglionic cells of the iris; at least, I must refer to this as a probability, until it is disproven by the discovery of new facts.

This view, arrived at by exclusion, is further corroborated by the fact that chloroform will not contract the pupil of the cat, in which animal these ganglia, as it seems from other physiological reasons, are not well developed, though I do not know of any anatomical proof of this inference. Having repeatedly observed this want of contraction during anæsthesia, I sought to determine whether this was to be ascribed to asphyxia produced in that animal. But, on causing chloroform to be inhaled through the widely-opened trachea, the pupil remained as *wide* as ever. I have likewise failed to see any pupillary contraction in the cat during morphia narcosis.

But in other animals, also, has the pupillary contraction during anæsthesia been denied. By giving chloroform during chloral narcosis, Schiff and Foa* claim to have seen the pupil dilate; in fact, Schiff asserts that chloroform always induces dilatation, in proof of which he cites the clinical experience of Juengken (*Die Anwendung d. Chlorof. bei Augenoperation*, 1850), who speaks also of a constant dilatation. A similar statement was made by Dogiel (loc. cit.), who observed in rabbits an initial contraction followed by dilatation, the latter being increased by stimulation of the sympathetic, but which procedure was of no effect on the former. (We have, however, just given our reasons for not admitting paralysis of that nerve during any stage of anæsthesia.)

Convinced that chloroform narcosis was always productive of a final contraction, Budin and Coyne (*Gaz. Med. de Paris*, Feb. 20, 1875) inquired more thoroughly into the details of

---

* *Gaz. Med. de Paris*, Feb. 13, 1875, "Sur la pupille comme esthesiometre."

these experiments, and found that from faulty administration of the agent, the anæsthesia was always complicated with *asphyxia.* If this was induced by preventing free access of air, a dilatation was the constant result. An instance of this phenomenon I have lately observed in a woman etherized for an operation on carious bone. The contraction caused by the ether at once disappeared on commencing the incisions, but on pushing the ether, without shutting off the air, asphyxia was induced by falling back of the tongue. This was immediately indicated by a purple color of the lips, a respiratory movement of the alæ nasi, and a dilatation, though still immobility otherwise, of the pupil. On removing the ether, the return of consciousness was soon betrayed by further dilatation. This order of phenomena occurred repeatedly during the operation. Budin and Coyne found the same dilatation in asphyxia without anæsthesia—at first moderate and accompanied by immobility of the pupil, but increasing when the convulsive symptoms appeared. Similar results were also obtained by Balogh (*Moleschott's Unters.*, VIII., s. 423), except that the enlargement of the pupil was preceded by a primary contraction, which seems to have escaped the attention of other writers. The dilatation is of central origin, as it was found wanting after destruction of the dilator fibres. After the dilatation a contraction again followed, the occurrence of which, according to Balogh, rendered all attempts at resuscitation futile.

In asphyxia by carbonic monoxyd (CO) poisoning, on the other hand, Pokrowsky (*Virchow's Arch.*, bd. XXX., s. 525) found the contraction of death setting in only six to eight hours after life was extinct, and then only when the eyes were exposed to light.

On resuming the interrupted respiration in an asphyxiated animal, Schiff found a still further slight dilatation. This was much more marked, however, in the eye of which the corresponding sympathetic had previously been divided, and in which, of course, the pupillary enlargement due to asphyxia itself did not occur. As the same result was noticed on division of all ocular nerves, Schiff refers the dilatation, observed on recommencing respiration, to an excitation of the periphery of the dilator fibres by oxygen. A dilatation of the pupil was

also observed by Vigouroux (*Comptes Rendus*, 1863, LVII., p. 581) on violent respiratory efforts, but this has probably no connection with the changes in the blood, as pupillary enlargement was noticed by the same writer in *any strong muscular exertion.*

The essential processes in asphyxia may be imitated with the same effect upon the pupil, by withdrawal of the blood instead of the oxygen alone, for which A. Kussmaul (*Verh. der Phys. Med. Gesellsch. zu Wurzburg*, VI., s. 1) is our main authority. Compression of the carotid artery was found by him to result in a slight and rapid contraction, followed by dilatation. On obstruction of the innominate artery, the secondary dilatation reached its maximum. Restoration of the blood supply was always accompanied by pupillary enlargement. I have myself observed a maximum dilatation in several direct transfusions I have witnessed. These phenomena, like those in asphyxia, appear to be of centric origin, as in two cases (dogs) in which Wernicke (*Virchow's Arch.*, bd. LVI., s. 397) succeeded in cutting the roots of the exposed ciliary ganglion, compression of the innominate artery ceased to be of effect on the pupil.

Sudden arterial hæmorrhage is followed by dilatation, while gradual oozing results in contraction, passing finally into enlargement of the pupil. The same is observed in venous depletion. After enfeeblement by the latter, sudden compression of the carotid artery still contracts, but not as much as was caused by exposure to light before that procedure. Compression of the jugular veins results often, though not constantly, in contraction yielding to dilatation on cessation of the pressure. Kussmaul found also a slight contraction on flexing the head on the chest, probably from circulatory disturbances, and the reverse on extending the same.

Another factor has occasionally been asserted to be of influence on the size of the pupil; we refer to the intra-ocular tension. A rise of the same is said to be accompanied by dilatation, and *vice versa.* If, however, the pupillary enlargement in glaucoma is cited as an example, this can be objected to on the ground, that in that disease the nerves are paralyzed by the compression which they undergo. In fact, we know merely of one procedure which, by raising the intra-ocular tension,

enlarges the pupil: we refer to the experiments of Hensen and Voelkers, who saw dilatation ensue on injection of fluids into the ball of the eye, and this is by no means conclusive evidence of the dependence of the size of the pupil on the ocular pressure. Direct compression of the eye affects neither the size nor the shape of the *living* iris, *while the dead pupil can be distorted by pressure on the globe.* On the other hand we can lower the tension with the invariable result of strong contraction—by opening the anterior chamber. This result is not prevented by section of the motor oculi (Valentin), nor by the use of atropine, nor does the pupil in glaucoma entirely cease to respond (v. Graefe), though the contraction is less. I have also seen the pupil constricted by calabar bean contract still farther under the influence of this operation. The dead pupil, however, will not contract in this manner, though Trauvetter (*Arch. f. Ophth.*, bd. XII, 1, s. 132) claims to have seen the atropinized iris still contract on paracentesis *immediately* after life was extinct. This phenomenon is due partly to irritation of the ganglia in the iris, or it might be considered as the result of a reflex irritation of the trigeminus, since, according to Gruenhagen (*Virchow's Archiv*, bd. XXX., s. 481), the pupil will contract and remain so for some time in the rabbit and frog, by another similar procedure, in which no aqueous humor is lost, and hence no reduction of pressure occurs, viz.: insertion of a cataract-needle between the lens and iris, and pushing the latter forward. Another factor of the result, however, is the sudden and intense congestion of the iris from diminution of pressure by paracentesis corneæ, and only in this way can we account for the contraction in glaucoma, and in the atropinized cat's eye. Paralysis of the sympathetic, which might be accused of bringing on this result, since Gruenhagen (loc. cit.) could not dilate the pupil by stimulating that nerve immediately after evacuation of the aqueous humor, does not really occur, for Hensen and Voelkers were able to demonstrate the usual influence of the dilator nerve, by obviating the *adhesion of the iris to the lens*, by submersion of the eye under water. These considerations render it evident that no direct connection exists between the intra-ocular tension and the size of the pupil.

Apart from the practical interest in the action of poisonous agents, they furnish us the means to carry our physiological investigations farther than the scalpel will permit, and especially are they applicable in experiments as delicate as those on the iris must necessarily be; hence, we shall now study their influence on the pupil.

Myosis is most conveniently produced by the instillation of extract of calabar bean. In from five to forty minutes, according to the strength of the article, a strong contraction of the pupil, greater than from any other means applicable in man, ensues, lasting from two to four days, though its effects begin to diminish after the lapse of six to twelve hours. The duration of the myosis is apparently less variable with the dose than the period of its establishment. According to Rossbach and Froehlich,* the contraction from large doses is followed by dilatation; this, however, is denied by Krenchel ("Ueber die Wirkung des Muscarins," *Arch. f. Ophth.*, bd. XX., 1, s. 142). In rabbits, birds, reptiles and fishes, Donders (*Anomal. der Acc. u. Refract.*) saw but little effect from ordinary doses, but by the use of strong solutions, he could obtain an intense contraction. Concomitant with this is a slight sympathetic diminution in the size of the other pupil, a consequent darkening of the field of vision, and a spasm of accommodation. At a certain period before the myosis is complete in man, very rapid oscillations of the iris are observed according to v. Graefe (*Arch. f. Ophth.*, IX., 3). The same investigator could not obtain absolute immobility of the iris, as strong light still produced a further diminution of the size of the pupil. Other writers, on the contrary, claim to have attained this result, which probably depends on the dose employed. Schelske (*Monatsbl. f. Augenheilk.*, Aug., 1863, s. 380), however, announces the very curious fact, that the pupil, which before reaching its maximum contraction, undergoes an oval distortion, the vertical diameter being the longer, *dilates* slightly and returns to this abnormal shape in man and rabbit *on exposure to strong light.* Possibly this phenomenon and the oscillations observed by v. Graefe and his students amount to the same thing.

* *Verhandl. der Med. Phys. Gesellschaft z. Wurzburg*, bd. I., s. 1–79.

The contraction of calabar bean has been explained by a supposed paralytic influence of the drug on the dilator nerves, while a stimulant effect on the motor oculi was also ascribed to it by various authors. Taking this hypothesis as a basis to start on, let us seek either to confirm or confute it by the results of experimentation. The effects on the pupil of direct stimulation of the sympathetic, as well as division of that nerve, were lessened, though not entirely obviated, by the agent in the experiments of Schelske and Donders, while Engelhardt (*Unters. aus dem Phys. Laborat. zu Wurzburg*, bd. IV., s. 296) and others found no response whatever from excitation of the dilator nerve. Fraser showed subsequently that this difference was due to the dose employed. Direct electrization of the iris still results in dilatation (Engelhardt, loc. cit.), though according to Schelske (loc. cit.) the strength of the current must increase with the dose of the bean, in order to attain the desired end. *On instillation, however, of atropine into the calabarized eye, the effects of stimulation of the sympathetic were fully restored* in the experiments of Gruenhagen,* so that both direct stimulation of the nerve as well as its excitation by asphyxia, previously unable to affect the size of the narrow calabarized pupil, enlarged considerably the then dilated pupil. A paralysis of the dilator nerve and muscle being thus excluded, and knowing that the atropine paralyzes the nerves of the sphincter, the conclusion is inevitable that the want of response in the calabarized eye to sympathetic influence, is due *to a resistance to the action of the radiating fibres by the spasmodic contraction of the sphincter iridis.* That this spasm can overcome the influence of the dilator nerve, was shown by Ragow (loc. cit.) by strongly contracting the pupil by exposure to sunlight, when no effect was observed on exciting the sympathetic.

The contraction of the sphincter can hardly be owing to a direct influence of the agent on the muscular tissue, since the twitching of other muscles in calabar bean poisoning is prevented by curare (Ragow), which, as we know, paralyzes the terminations of motor nerves, thus proving the spasm to

* *Berl. Klin. Wochenschrift*, 1865, No. 23, 24; and Ragow, *Henle u. Pfeifer's Zeitschrift f. Rat. Med.*, 3te reihe, bd. XXIX., s. 1.

be of nervous origin. If, however, calabar bean does still contract the pupil of the curarized rabbit, this is due to the fact that the motor oculi is one of the last nerves in that animal to succumb to the influence of curare. The cat's third nerve, on the other hand, is paralyzed early by curare, but I do not know that the effects of calabar bean have ever been studied in this animal under such circumstances. The contraction is not the result of excitation of the trigeminus, since the stimulation of that nerve (by its division) increases the constriction of the pupil; besides, the effects of calabar bean are the same in animals whose fifth nerve cannot contract the pupil. We are thus apparently forced to ascribe the contraction by the agent to excitation of the termination of the motor oculi. Cases of long standing paralysis of that nerve have, however, been reported, especially by Workman (*Ophth. Hosp. Reports*, IV., 1, p. 112), in which, from the length of time, a degeneration of the nerve-fibres might have been inferred, and still the effects of calabar bean were as marked as in the other normal eye. Donders tries to reconcile these facts by supposing that the agent stimulates *the ganglia in the iris*. To this it may be replied, that the effects of calabar bean are *not* produced in the well atropinized eye, in which, nevertheless, a contraction can be induced by various means, explicable only by the physiological integrity of *some* of the ganglia in the iris. Hence we cannot infer that those ganglia which are not attacked by atropine, are put into a state of excitation by calabar bean. We must also admit that in the pathological cases just cited, a degeneration of the motor oculi fibres was merely inferred, not proven anatomically. Nevertheless, it seems to us that the facts will admit of another mode of interpretation, viz., that the motor oculi is in some manner in connection with some of the ganglionic cells in the iris, and that the apparatus thus constituted is the part affected by calabar bean. This view would easily explain the phenomena in atropinization. The analogy between inhibitory nerves and the pupillary fibres of the motor oculi, in their yielding to the paralytic influence of atropine, had previously led Keuchler*

* "Das Atrop. und die Hemmungsnerven," *Inaug. Diss.*, Dorpat, 1868.

to the idea of placing the latter in that category; this view, however, is not justified by the facts. The slowness with which the nerve is attacked by curare, would also speak against a direct connection with the muscle, since we know that all nerves terminating in cells, like the vagus, etc., yield later to that agent than ordinary motor fibres. The objection that this view of mine of the arrangement of the ganglia is too complex, can hardly be maintained, since I do not urge it as a hypothesis, but merely offer it as an apparently plausible explanation, not in contradiction to any now known facts; besides, the innervation of the iris would, in that case, be no more complex than that of the heart.

Atropine, according to the description of Donders (loc. cit.), dilates the pupil largely in man, dog, cat and frog, less in rabbits, still less in birds, and scarcely if at all in fishes. The rapidity of its action on instillation into the conjunctival folds, depends upon the thinness of the cornea, hence this is penetrated most rapidly in youth, or after slices of it have been removed. Only after the agent has come in contact with the iris do its effects begin; in proof of which, we find dilatation on dropping into a normal eye the aqueous humor of an atropinized eye. In minute doses of 0.00006 grammes (about $\frac{1}{1000}$ gr.) Rossbach and Froehlich (*Verhand. d. Phys.-Med. Ges. z. Wurzburg*, bd. I., s. 79) found a *primary* contraction [denied by Krenchel (loc. cit)] which passed soon into the normal state, or dilatation. Stronger solutions cause a gradual dilatation, reaching its maximum in from 15 to 40 minutes, according to the concentration, and simultaneously with a complete immobility, lasting from 7 hours (solution of 1 part in 14,400 of water) to 5 or 8 days in man (Donders). On using a solution of sufficient strength, these phenomena are accompanied by paralysis of the faculty of accommodation, but the latter shows more resistance to the influence of atropine than the iris. In rabbits the effects of this agent are of less duration, passing off in about 6 hours, though mobility is restored half an hour previously.* Birds and frogs have but a dilatation of 2 hours' duration, followed by contraction, according to Donders,

* Schueller, "Ein Micrometer am Augenspiegel," *Arch. f. Ophth.*, bd. III., 2, s. 121–186.

though while Rossbach and Froehlich claim a primary contraction for the latter animals. The large amount of light entering the atropinized eye, on account of the enlargement of the pupillary aperture, induces a contraction of the pupil of the other side, which disappears on closing the mydriatic eye (Ruete).

The antagonism between atropine and calabar bean is highly interesting. Simultaneous instillation of both into the conjunctival folds, first excites the motor oculi termination and constricts the pupil, but after a time the effects of atropine predominate. Before the action of the latter has reached its maximum, and when it is in its decline, as well as when the quantity has been too small, a sufficient strength of calabar bean will contract the sphincter, though less intensely and for a much shorter time than otherwise. But in the *well atropinized* eye the contraction of the pupil from local application of calabar bean does not make its appearance; if, nevertheless, a constriction is observed on the use of calabarized paper, this was proved by Ragow to be due to the irritation by the paper and not to any specific action of the agent, as it could be produced with equal ease with non-medicated paper. Yet the atropinized pupil will contract on a strong subcutaneous injection of calabar bean; this was referred by Gruenhagen* to *central excitation of the fifth nerve*, forming this opinion, however, only by exclusion and the analogy between the effects of this and other agents on the salivary glands. Schiff also saw the phenomenon and found it most marked on section of the sympathetic.

The action of atropine (and of course belladonna) gave rise to the so-called paradox theory of Weber, viz.: that the agent paralyzes the motor oculi and stimulates the termination of the sympathetic. This theory was adopted by most writers, and has been especially defended by De Ruiter in his inaugural thesis, "De Actione Atropæ Belladonnæ in Iridem" (we can quote from this only by citations of Donders, Gruenhagen, and others). The paradoxical assertion, however, that the same agent paralyzes one nerve while it stimulates another, has

* "Iris und Speicheldruese," *Henle u. Pfeifer's Zeitschr. f. Rat. Med.*, 3te reihe, bd. XXXIII., s. 258.

elicited various modifications of the theory by other authors, with the fallacies of which we will not be detained, while we can point out their arguments as we pass along.

The dilatation of the atropinized pupil and its immobility to light, suggests at once paralysis of the motor oculi, or more cautiously speaking, interception of the communication between it and the sphincter. This was directly demonstrated by Gruenhagen, Engelman, Keuchler, and others, by galvanizing without effect the third nerve of the corresponding side, of course testing the nerve of the other side comparatively, and with a positive result. Whether this paralysis is preceded by stimulation of the motor oculi, as Rossbach and Froehlich claim, is as yet undecided, though plausible, since we know that many, if not all, sedatives stimulate before they paralyze the parts attacked. Still, the contraction which they claim, is positively denied by Krenchel (loc. cit.), besides being overlooked by all other experimenters.

The question as to whether atropine paralyzes the sphincter muscle, would seem to be *negatively* answered, if by any means we could obtain contraction of the atropinized pupil; this, as we shall detail hereafter, can be done by various means, acting through the fifth nerve and the ganglia in the iris. But here Gruenhagen, who claims a muscular paralysis, objects on the ground of his theory, that the fifth nerve contracts the pupil by destroying the tonus and elasticity of the iris. But this would hardly apply in the case of the contraction observed by Zehender (*Arch. f. Ophth.*, bd. II., 2, s. 97), who found the maximum dilatation of the well atropinized pupil *in the morning* diminishing somewhat during the course of the day, evidently from the influence of the light upon the iris itself. But our main proof must be direct electrization of the iris. Bernstein (*Henle und Pfeifer's Zeitsch. f. Rat. Med.*, 3te reihe, bd. XXIX., s. 35) claims to have contracted the atropinized pupil by means of the double electrode arrangement in the centre of the cornea, which Engelhardt (loc. cit.) subsequently employed with the same result. As these experiments were performed mostly on rabbits, I thought of attempting them in the dog, but I could neither contract the atropinized, *nor the normal pupil*, by either the above arrangement or direct application of the poles

to the iris, laid bare by excision of the cornea; or finally, by suspending the rapidly excised iris on hooks included in the electric circuit. But all this failure does not justify me in discrediting the positive statement of the authors cited; it merely proves that my methods were in their details inadequate for the desired purpose. Gruenhagen has made very elaborate researches on this point.* He could never produce a primary contraction of atropinized pupil, but the dilatation, which is much easier attained in the atropinized pupil than in the other, was usually followed by a considerable secondary contraction, especially in curarized rabbits, and sometimes by loss of irritability. But if the superior cervical ganglion had been extirpated for a sufficiently long period to result in degeneration of the dilator fibres, he could easily *contract* the atropinized pupil in curarized rabbits, the constriction remaining for 20 to 30 minutes, and followed by dilatation. The explanation of this result depends simply on the fact that it takes a stronger current to excite the muscle than the nerve, and the details suggest themselves at once. As, however, the activity of the fifth nerve is not thus excluded, Gruenhagen resorted to cats, whose fifth nerve possesses no pupil-constricting fibres. According to Gruenhagen, curare paralyzes the motor oculi in these animals, so that localized electrization can only dilate the pupil, but the segment of the sphincter included in the circuit undergoes a contraction, which is prevented by atropine. However, admitting himself that not too much weight could be placed on this result, so difficult of observation and likely to be overlooked, he instituted another experiment. According to him, the contraction easily obtained in the cat's pupil, whose dilator fibres have undergone degeneration, cannot be produced in any way after the use of atropine.† But the same objection exists also in this place, viz.: that the nerve requires a weaker current for its excitation than

* "Ueb. die Wirkung d. Atrop., etc." *Zeitschr. f. Rat. Med.*, 3te reihe, bd. XXIX., s. 275.

† Like Budge, Gruenhagen also made the strange observation, that the pupil, some weeks after extirpation of the superior cervical ganglion, and total degeneration of the dilator fibres, may be *actually* wider than the normal pupil of the other side, especially under the influence of curare.

the muscle, and the current striking the fibres of the iris by diffusion through the anterior chamber, has certainly lost much in intensity.

Therefore, even if we were to accept Gruenhagen's view of the action of the fifth nerve, a paralysis of the sphincter muscle by atropine is by no means proven, while if we discard that hypothesis, the integrity of the muscle is beyond doubt.

Is the dilatation by atropine merely the result of the removal of the sphincter iridis from the influence of the motor oculi? In bilateral amaurosis, where no reflex impulse for the activity of the third nerve exists, atropine enlarges the pupil still further. An increase of the dilatation was also obtained by Ruete in cases of paralysis of the motor oculi in man, and the same was the result after experimental section of that nerve in rabbits by Bernard. But the cat seems to be an exception in this instance also, since Schiff could not enlarge the pupil by means of atropine after section of the motor oculi in that animal. Gruenhagen also saw no difference between the atropinized and other pupil in the curarized cat, in which the motor oculi was thus paralyzed. But as we know that the innervation of the cat's iris is quite peculiar, this will not affect the strength of the other arguments. Atropine will also dilate the pupil of the *extirpated* eye in the dog and rabbit (De Ruiter), where of course the influence of the third nerve is removed, though, according to Budge, the enlargement does not exceed the width of the pupil in death (*i. e.*, death of the iris itself), merely occurring sooner than it would without the agent.

An irritated state of the termination of the sympathetic has been assumed to account for this increase of dilatation. At first sight this seems necessary, as considerable force is exerted in the dilatation, manifested by the zigzag periphery of the pupil, when central adhesions exist between the iris and the lens or cornea, and by the forcible rupture of these adhesions. But even if we hesitate to ascribe this result to the elasticity of the iris, which by itself would dilate the pupil, we are not to forget that the radiating muscular fibres are constantly in a state of tonic contraction, and that this alone suffices to account for the force displayed in atropine dilatation, in which the opposing contraction of the sphincter is removed. Another argu-

ment in favor of irritation of the sympathetic is the experiment of Czermak (*Moleschott's Unters.*, bd. VII., s. 368, et seq.), who, on removing the cornea in a decapitated rabbit, and excising the *sphincter iridis*, obtained still marked dilatation of the pupil by contraction of the remaining dilator fibres on the instillation of atropine. Yet it must be admitted, on unbiased reflection, that this experiment, performed as it was, on a dead animal, and under circumstances far from excluding errors of observation, cannot be of much weight until repeated with special precautions. The dilatation which Czermak found, must have been difficult to recognize on account of the mutilation of the iris, and the question arises, was it not the result of the *dying and rigor mortis* of the radiating fibres? At any rate, the irritation of the dilator muscle, or its nerves, could be but slight, and by no means maximum, since galvanization of the sympathetic *dilates* considerably the atropinized pupil, which, on the other hand, contracts on section of that nerve. Direct galvanization of the iris will also dilate the pupil still farther. How slight the assumed excitation of the dilator nerve by atropine would necessarily be is further shown by the scarcely perceptible difference between the two atropinized pupils of a rabbit whose superior cervical ganglion of one side has been extirpated for a sufficiently long period to result in degeneration of the dilator fibres. Both Braun ("Zur Lehre von den Mydriaticis," *Arch. f. Ophth.*, bd. V., 2, s. 112) and Gruenhagen affirm that the difference is so slight as to be accounted for easily by the permanent loss of tonus from central innervation, which the radiating fibres have suffered by that operation. As a last argument, we will but mention that once a maximum dilatation is obtained, no further enlargement of the pupil can be effected by means of subsequent application of the agent. Now as we know that with all substances stimulating nerves, the extent of the stimulation is proportional to the dose, while, according to Weber's theory, atropine would excite the dilator fibres to a *slight* degree, which could not be increased by a larger dose, we are safe in asserting that this theory is no longer tenable.

Atropine does not seem to exert any influence on the trigeminus, as the effects of section (stimulation) of the latter still

appear. The atropinized pupil of the rabbit contracts at once on section of the fifth nerve, though it enlarges again sooner than the normal eye. After division of the nerve, however, the dilatation will not reach the maximum of the other eye in the rabbit, while in the dog it will exceed it (Donders).

As the elasticity of the iris alone will not explain the excessive dilatation of atropine, Arlt, Jr. (*Arch. f. Ophth.*, bd. XVI., 1, s. 294) suggests that the remaining *tonus* of the sphincter muscle due to the ciliary ganglion and the cells of the iris itself may account for the difference in the pupil whose motor oculi is paralyzed, before and after the use of atropine, which agent he supposes to destroy this tonicity. Such a tonus, however, from the ciliary ganglion is not yet proven. Besides atropine will dilate the pupil after section of the ciliary nerves, according to Voelkers and Hensen, and from a quotation by H. C. Wood (*Therapeutics, Mat. Med., and Toxicology*), it appears that Vierordt could even obtain the usual dilatation after extirpation of the ciliary ganglion. Any influence of that centre is also contradicted by the pupillary enlargement produced by atropine in the extirpated eye. Now, since this dilatation is no greater than the final state of the pupil in death, the conclusion is forced upon us, that the agent operates by paralyzing some centre of innervation, existing in the iris itself. Not all of the ganglia, however, can be paralyzed, as we possess various means of contracting the atropinized pupil, which can only influence the ganglia. According to Rossbach and Froehlich, carbonic acid poisoning prevents the dilatation by atropine. The contraction of the atropinized pupil, seen by Trautvetter, in paracentesis corneæ, after the circulation has ceased, must be referred to stimulation of the ganglia. The usual contraction during anæsthesia, which is ordinarily prevented by the agent, will still occur, according to Gruenhagen (*Virchow's Arch.*, bd. XXX., s. 577), in long-continued etherization or rapid death by chloroform, even after previous division of the sympathetic. These contractions cannot be referred to the sympathetic, since they occur even after extirpation of the superior cervical ganglion and degeneration of its fibres. Irritation of the trigeminus will also contract equally both pupils, though one be atropinized, both on direct stimulation of the

trunk, or irritation of its origin by decapitation, or, finally, by reflex excitation by application of irritants to the cornea. Besides creosote, nitrate of silver, etc., even *atropine in substance* is sufficiently irritant to bring about this result (Ragow). But in the cat's eye these means will not succeed. We must therefore admit that the ganglia, which we have supposed to be connected with the fifth nerve, are not affected by atropine.

We cannot, however, contract the well atropinized pupil by means of calabar bean, which implies that the parts ordinarily excited by that myotic, are paralyzed by its antagonist. We have previously pointed out that the action of calabar bean cannot be limited to the motor oculi, but must extend also to the ganglia connected with that nerve physiologically, and their paralysis by atropine would sufficiently account for the further dilatation by that drug after section of the third nerve, as well as for all other phenomena observed.

The internal administration of atropine results also in pupillary dilatation, probably mainly from the local action after being carried into the aqueous humor, which Lemattre (quoted by H. C. Wood, *Therapeutics*, etc.) found to possess dilating properties in belladonna-poisoning. Accordingly we find dilatation even after the sympathetic and trigeminus have been divided. After H. C. Wood (*Therapeutics*, etc.) had had a rabbit's eye cleared of all nervous connection except the optic nerve, by cutting down to the latter, the hypodermic administration of atropine still dilated the pupil, though less than the other, since by destruction of so many vessels the agent could not enter the eye as freely, and besides had to overcome the contraction induced by the operative procedure. The same was the case in a patient at the Pennsylvania Hospital, who, by a railroad injury, had had the temporal side of the orbit opened, and the facial, third, and fifth nerves severed, while also the carotid plexus was pressed upon and paralyzed, the eye being thus severed from all nervous connection. In this case also did Wood (loc. cit.) dilate the pupil by the internal use of belladonna.

A dilating influence on the pupil is possessed also by the analogous alkaloids, hyoscyamine and daturine (stramonium), which act in about the same manner as atropine (*vide* article

on hyoscyamine by R. Simonowitsch in *Knapp's Archives*, IV., 2, p. 157). Pupillary enlargement has been observed also in strychnia-poisoning; but, according to Schiff, this is due to the asphyxia caused by the agent, since it is prevented by artificial respiration.

The internal administration of jaborandi is accompanied by mydriasis, due to *central* stimulation of the sympathetic (Galippe and Bochefontaine, *Gaz. Med. de Paris*, Feb. 20, 1875). Locally applied, however, the same agent results in myosis with spasm of the accommodation. The same occurs likewise, on the local use of muscarine; the alkaloid of amanita muscaria, which, according to Krenchel (*Arch. f. Ophth.*, bd. XX., 1, s. 142), seems to act in a manner analogous to calabar bean.

Nicotine locally applied, contracts the pupil, after first dilating it slightly by stimulation (probably reflex) of the sympathetic, which latter effect seems to depend on a specific, and not on the irritant properties of the agent.* The contraction from local application, however, is not due to paralysis of the dilator nerve, for though galvanization of the sympathetic does not dilate under these circumstances, it does this easily after the instillation of atropine (Gruenhagen, *Berl. Klin. Wochenschrift*, 1865, No. 23, 24), thus proving that the previous want of success was due to resistance on the part of the sphincter. Yet the sympathetic *is* paralyzed, perhaps by over-stimulation, on internal administration of nicotine, as is shown by the impossibility of dilating the pupil by galvanization of the nerve or excitation of it by asphyxia (Ragow); hence a contraction occurs, which in this case, is almost entirely due to the withdrawal of the influence of the sympathetic, and is much increased by subsequent instillation of the drug into the eye. In cats, no contraction occurs in poisoning with nicotine, though the sympathetic is also paralyzed in those animals. Possibly, the want of marked contraction in cats, is due to the elasticity of their tough iris, the pupil being naturally very large in these animals. But nicotine internally does certainly also stimulate the ganglia in the iris, though

---

* Schurr, *Zeitschr. f. Rat. Med.*, 3te reihe, bd. XXXI., s. 373.

much less than on local application, for it takes an increased strength of current to dilate the pupil by direct electrization. The contraction caused by *instillation* of the agent, is partly the result of stimulation of the motor oculi and the ganglia belonging to it, since atropine diminishes not so much the extent as the force of the constriction. Hence dilatation by excitation of the dilator fibres, previously impossible, is now a matter easily accomplished. But atropine neither prevents nor removes the nicotine contraction; an action, therefore, of the latter agent on the ganglia connected with the fifth nerve, or on the periphery of that nerve itself, cannot be denied. Accordingly, contraction by local application is by no means a constant result in cats. After the lapse of some time after section of the fifth nerve, nicotine will not affect the pupil of the eye (Hirschman); (*Du Bois Reymond u. Reichert's Archiv f. Anat.*, 1863, s. 309); though according to Ragow, a contraction is still possible *immediately* after that operation.

Reviewing the important points we have gone over, and expressing them in formulæ to serve as basis for the symptomatology of the pupil, we come to the following conclusions:

I. The third nerve contracts the pupil, and serves as a centrifugal reflex route for the impulses started by luminous impressions made on the optic nerve, each anterior tuberculum quadrigeminum acting as centre for the opposite, and partly also for the same side. The dilatation on withdrawal of light is due to the elasticity of the iris.

II. The sympathetic nerve dilates the pupil by calling into activity the radiating muscular fibres. The reflex impulse for this dilatation, starting in any sensory impression, passes from the centre in the medulla oblongata, through the cilio-spinal region into the cervical sympathetic, by route of the anterior spinal roots and the rami communicantes; joining the carotid plexus, the dilator fibres pass along with the trunk of the fifth nerve, not decussating in their entire course. The contraction on cessation of the influence of the sympathetic, is also due to the elasticity of the iris.

III. The fifth nerve, on which the sensibility of the iris depends, possesses also pupillary fibres, the constricting fibres predominating in man and some animals, the dilating fibres in

others. Reflex excitation of that nerve starts mainly from painful impressions made on the eye itself.

IV. The ciliary ganglion receives in man and most animals, the different nerve-filaments supplying the iris; it is not yet proven that pupillary fibres originate in this ganglion.

V. Numerous ganglionic cells are found in the iris, which, as appears from physiological facts, communicate partly with the motor oculi, and partly with the fifth nerve. On the former set depends, in part, the tonus of the sphincter. Their activity seems to constrict the pupil.

VI. As a type of different mydriatics, atropine paralyzes the motor oculi and the ganglia connected with it, which parts on the other hand,

VII. Are stimulated by calabar bean. Internally, this agent will also contract the pupil by central stimulation of the fifth nerve.

We will now proceed to study the clinical evidence furnished by the pupil on the strength of the previous physiological data.

In a case of mydriasis, the entire want of response of the iris to light, is proof of paralysis of the motor oculi; mere sluggishness, however, of the movements may be due also to irritation of the dilator fibres. To discover the origin of the dilatation, we must recollect that the difference between the mydriatic and the normal eye *increases with the intensity of the light* in case of paresis in any part of the reflex route for light, *while it diminishes with the brightness of the illumination*, if due to an irritated state of the sympathetic (*i. e.* in unilateral affections). Bilateral application of atropine, on the other hand, removes the difference, if of cerebral origin, while it increases it, if from sympathetic excitation. Exclusion of the light from the retina by opacities of the transparent media being rarely complete, results but in a moderate enlargement, with mobility impaired according to the extent of the opacity; if one-sided, movements sympathetic with those of the other pupil will still occur. The same takes place in atrophy or destruction of the optic nerve, when the dilatation is greater, with no visible reaction whatever to light striking the affected eye. Impairment of the functions of the optic nerve with mydriasis,

occurs in most nervous diseases marked by cerebral depression, stupor or coma, as apoplexy, etc. The dilatation in this affection distinguishes it from the coma of opium-poisoning. The second stage of inflammatory troubles of the brain, attended with effusion, is also characterized by mydriasis. Hydrocephalus brings about the same result; in a case of this disease, Wilks (*Guy's Hosp. Reports*, VII., 1860) could produce dilatation of either pupil by inclining the head towards the corresponding side. Cerebral anæmia has also a tendency to enlarge the pupil. The dilatation, however, observed in the beginning of epileptic attacks by Magnan (*Comptes Rendus de la Soc. de Biol.*, 1873, p. 75–83) can hardly depend on anæmia, since concomitant with it is a hyperæmia of the fundus oculi. In the delirium of typhus, Graves (*Dublin Journal*, No. XXIV., 1838) observed mostly a moderate dilatation; a contraction of the pupil in this disease to the so-called pinhole size was found by him the constant precursor of death. Compression of the third nerve by tumors, exudation, etc., of course results in mydriasis, with impairment of mobility proportionate to the degree of the paralysis; if the latter be total, sympathetic movements cease entirely. Pupillary enlargement may be due also to paralysis of the motor oculi terminations, in glaucoma; or the mechanical interference of the movements of the iris by adhesions of the latter to the lens or cornea. Such adhesions often deceive the observer as the origin of the mydriasis; they are easily recognized with the use of atropine. Myopia also shows a wider pupil than proper to the normal eye. Wounds of the orbit occasionally result in dilatation, when the free mobility indicates that no motor nerves have been injured — probably from reflex action through the sympathetic or fifth nerve; neuralgia of the latter is also often attended with pupillary enlargment, which is sometimes found in its paralysis.

Following the route of the sympathetic we see mydriasis resulting at times from an irritative state of the latter by inflammation in its vicinity, etc. Such dilatation is generally excessive, without, however, interfering very much with the mobility of the pupil. Receding, we find an enlargement from spinal irritation, as in an inflammatory state of the cord, not necessarily in the cilio-spinal region, since as we see in animals,

any intense sensory impression results in reflex mydriasis, through the sympathetic. Thus, very painful peripheral affections widen the pupil, but especially is this observed in irritation in parts supplied by the sympathetic system, as frequent instances of which we need but to mention the mydriasis from intestinal parasites, pelvic cellulitis, stone in the bladder, etc. Brown-Sequard has lately reported some cases of temporary pupillary enlargement following the application of the hot iron to the nucha. A dilated state of the pupil is also observed in some diseases of nutrition, as syphilis, diptheria, anæmia, and cachexia, from almost any cause; the presumption is that the immediate cause of the mydriasis is to be sought in the condition of the brain in these affections.

Distortion of the pupillary aperture we should expect in cases of paralysis of individual ciliary nerves; Hensen and Voelkers actually report a case of such an affection.

In pathological myosis, the difference between the affected and normal eye *increases with the darkness*, if due to paralysis of the sympathetic, but if resulting from an irritated condition of the motor oculi or its corresponding sensory nerve, the opposite is by no means always the case. Atropine renders the difference more perceptible, if of sympathetic origin; if from irritation of the motor oculi, it dilates both pupils equally. But in the latter case an irritated condition of the trigeminus is also frequently present, and the contraction from this is not entirely removed by the mydriatic; this we observe in keratitis, iritis, etc. Overstraining of the faculty of accommodation in hypermetropia and aphakia contracts the pupil, as well as the continued exertion of the emmetropic eye in the examination of minute objects—for instance, in watchmakers. An irritable condition of the retina, or the fifth nerve in photophobia, occasionally after all inflammatory troubles have ceased, reduces the pupil to pin-hole size, which is scarcely influenced by a stronger illumination, though slightly dilatable on removal of light. Following the cerebral reflex arch of the iris, an irritation in any part of the same is attended with myosis, as in cerebral hyperæmia, and the first stage of inflammatory disease. Irritation also of the motor oculi by the *slight* pressure of tumors, etc., in the cranial cavity or orbit produces

the same result. Anæsthesia of the fifth nerve, as we have seen, is occasionally accompanied by myosis. Physiological deductions as well as clinical observation, teach us that paralysis of the sympathetic, in any part of its course, contracts the pupil without destroying entirely the mobility in most cases. Thus, myosis occurs in impairment of function of that nerve by compression from a cervical abscess, enlarged glands,* or even aneurism of some arteries of the neck. Further on, injuries or softening of the cilio-spinal region of the cord can lead to a contraction of the pupil. Heart disease, especially hypertrophy, was found by Frank (*Schmidt's Jahrbuecher*, bd. LXIV., s. 242, 1849) to be accompanied frequently by myosis, though unimpaired mobility of the pupil, with other symptoms of irritation of the retina, which he refers to a disturbance of cerebral circulation. Lately attention has been called again to the myosis in heart disease, by De Giovanni (*Gaz. Med. de Paris*, 16, 1875), who sought the cause in an impairment of the nutrition of the sympathetic, but could not produce it artificially in animals by ligation of the subclavian vein.

A transient pupillary difference was noticed by Graefe as the frequent precursor of mental disturbances; since then the subject has been treated by Seifert (*Allg. Zeitschr. f. Psych.*, bd. X., s. 544, et seq.), Nasse (Id., bd. XXV., s. 665, et seq.), and Wernicke (*Virchow's Arch. f. Path. Anat.*, bd. LVI., s. 397), to whom we must refer for details. They all agree, that while no prognostic value is to be attached to the phenomenon, pupillary differences occur in at least one-quarter of all cases of insanity. The anomaly is seldom very great unless traceable to organic lesion, not constant, disappearing sometimes quite rapidly, and frequently changing from myosis to mydriasis, or from one eye to the other. According to Seifert (loc. cit.) the amount of the difference in mania indicates to some extent the cerebral irritability.

Another state of the pupil is yet to be noticed — hippus. This anomaly, consisting in rapid, active oscillations of the iris, is to be distinguished from the tremulousness of the pupillary border observed in separation of the iris from the anterior sur-

---

* I have seen myosis produced by an immense goitre, which the autopsy proved was compressing the sympathetic.

face of the lens, as in aphakia, the latter being often very marked in nystagmus. An artificial hippus occurs during the beginning of the action of calabar bean, according to Graefe; hence this state is referred by most oculists to a spasm of the third nerve.

Art. II.—SOME PRACTICAL OBSERVATIONS ON EXOPHTHALMIC GOITRE AND ITS TREATMENT.*

By Roberts Bartholow, M.A., M.D.,

Professor of Theory and Practice of Medicine, and of Clinical Medicine in the Medical College of Ohio, etc.

No case of Graves' or Basedow's disease can be considered complete, without the presence of three characteristic phenomena: irregular and rapid action of the heart; enlargement of the thyroid body, and exophthalmos. This group of symptoms is so familiar under the designation of *exophthalmic goitre*, that it would be a reflection on the intelligence of this body to occupy time with an account of its clinical history. But many cases are met with, in which but one or two of the typical symptoms are present. As regards the relative frequency of the physiognomonical characteristics, the increased action of the heart stands first, the enlargement of the thyroid second, and the exophthalmos third. It is, no doubt, true that many cases of rapid action of the heart with paroxysmal palpitations, have their origin in the same pathological state; but owing to causes at present not known, the other symptoms are not produced, and the cases do not proceed to their full development. It is equally certain, that many cases of so-called *goitre* are really examples of Graves' disease—the enlargement of the thyroid, only, attracting attention. The capital distinction

---

* Read before Medical Section, American Medical Association, last meeting at Louisville, and referred for publication in the *Transactions*.

between goitre and Graves' disease, is this: in goitre there exists an hypertrophy or hyperplasia, or both, of the proper gland elements; in Graves' disease, the increase in the size of the thyroid is due largely to the dilatation of its vessels, and to the hyperkinesis of the heart, and any increase in the size of the gland elements is secondary and non-essential. In the one, enlargement of the gland is continuous or uniform; in the other, it is subject to great fluctuations. I need hardly stop to suggest the important bearing which these facts have on the treatment of the two states, and the necessity which exists in every case of apparent goitre, to study the action of the heart and the cervical vessels. It must be evident, I think, that the use of the word *goitre*, to designate this peculiar malady, is unfortunate—for true goitre, except in the single symptom of swelling of the thyroid, is in every respect unlike exophthalmic goitre.

Graves, who first described this malady, distinctly recognized the difference in the character of the thyroid swelling in the two diseases (*Clinical Lectures on the Practice of Medicine*, ed. by Neligan, vol. II., p. 193). He, no doubt, correctly indicated the nature of the change in the thyroid in the following remarks:

"The sudden manner in which the thyroid used to increase and again diminish in size, and the connection of this with the state of the heart's action, are circumstances which may be considered as indicating that the thyroid is slightly analogous in structure to the tissues properly called erectile."

This explanation of the enlargement of the thyroid and of the changes in size which it undergoes, has been made by Henoch, Bullar, Laycock and others. By Henoch the change in the thyroid has been designated *struma aneurysmatica* (*Virchow's Geschwülste*); and by Laycock, *bronchocele vasculosa*. Virchow, who distinctly affirms the changes which take place in the vessels of the thyroid, also calls attention to the hyperplasia of the gland elements, and to the cystic, calcareous, and fatty degenerations which frequently co-exist with the vascular dilatations (*Die krankhaften Geschwülste*, dritter band, erste haelfte, s. 72, et seq.). At p. 12 of the same volume, he gives a drawing of a *struma exophthalmica vari-*

cosa. By Dr. Bullar, two cases were reported under the title of "*pulsating bronchocele*" (*Medico-Chirurgical Transactions*, vol. XLIV., p. 37). Trousseau, in an admirable clinical lecture on this disease, states, that in addition to hypertrophy of the gland elements, "great development of the blood-vessels of the gland may be made out clinically" (*Clinique Médicale*, vol. II., p. 458).

We have the high authority of von Graefe for the assertion that cases of this disease may exist in which there are present, only, rapid action of the heart, and such a slight degree of exophthalmos, that it is observed only in certain movements of the eyelids. In these slight cases, there exists a defective co-ordination in the movements of the eye, and of the eyelids. When such patients are told to look down, the upper lid does not follow the movement of the ocular globe, and a white rim of the sclerotic comes into view. This defect of co-ordination is independent of the exophthalmos, and is caused, according to Graefe, by spasm of the superior palpebral muscles of Mueller, which are innervated by the sympathetic. In cases of palpitation of the heart, and a sustained elevation of the pulse-rate occurring in women, although the thyroid may be unaffected and exophthalmos be absent, the defective movement of the upper eyelid will indicate the nature of the symptoms.

ILLUSTRATIVE CASES.

CASE I.—*Paroxysms of Palpitation of the Heart; Constant Elevation of the Pulse-rate; Intercostal Neuralgia; Occasional Fullness of Thyroid, and Slight Exophthalmos.*

Personal History.—Mrs. H., a Jewess; in complexion, a brunette; æt. 32; married, and the mother of four children. She has always enjoyed good health, and is not aware of the existence of any hereditary ailments in her family. She has been subjected to various trials within a few years, in the sickness of some of her children, but more especially in the business failure of her husband.

Disease History.—The symptoms of her present ailment began during lactation about three years ago. She had more or less constant pain in the right side, chiefly in the intercostal

space between the fifth and sixth ribs. About the same time she began to experience attacks of palpitation, lasting several hours. These frequently came on in the night, and she was often awakened out of her sleep in a condition of great terror. During the attacks of palpitation, she experienced a feeling of extreme anxiety and apprehension, independently of the cardiac disturbance, and an unpleasant suffocative sensation about the throat and neck. When she first consulted me for these troubles, I did not realize the real nature of the cardiac disturbance, and supposed the intercostal pain and the paroxysms of palpitation, to be manifestations of hysteria, merely. For more than two years, and after weaning her child, these symptoms continued without any new developments — the paroxysms of palpitation becoming somewhat more frequent, and the pulse at all times ranging much above the normal level. During one paroxysm, I found the pulse had risen to 140, and the volume and rhythm were extremely varied. At all other times, the pulse-rate continued at 86 to 90. During this period, her general health declined. She got out of breath on slight exertion; her lips and tongue were pale, and the sclerotic became pearly white and glistening; her appetite was poor, digestion slow and painful, and constipation alternated with attacks of colic and diarrhœa. She experienced great depression of spirits, was wakeful at night, had attacks of dizziness and singing noises in the ears, and her vision became dim and uncertain. She was altogether so miserable as to declare herself indifferent to life.

During this period she received the usual tonic and chalybeate medicines without any marked relief. Nine months ago, during one of her paroxysms of palpitation, I observed that her eyes had a somewhat staring look, and, when told to look down, the diagnostic sign, so much insisted on by Graefe, had become evident, *i. e.*, the upper lid did not follow the downward movement of the globes. Close examination of the neck disclosed an abnormal fullness of the thyroid region, especially on the right side, but it was by no means well marked or conspicuous. The character of the case was now made plain. Abandoning all medicines, and directing a suitable hygiene, I used the constant galvanic current as the remedial agent. I

applied twenty elements of Siemens and Halske, the negative pole being placed on the epigastrium, and the positive being so applied as to include the cervical sympathetic, the pneumogastric, and the cilio-spinal region within the circuit. The *seances* were ten minutes in duration. The immediate effect of the application was to slow the action of the heart to about the normal, and several applications caused the almost total disappearance of the unpleasant symptoms. Acting by my advice, she has occasional applications made with a view to prevent a recurrence of the symptoms.

Commentary.—This case perfectly exemplifies the observation of Graefe that in many subjects, women especially, exophthalmic goitre may exist for a long time without any other symptom being present, beside the increased action of the heart, than incoördination of the ocular globe and upper eyelid. When a marked increase in the action of the heart continues for a long time without apparent cause, in a young woman, and is accompanied by more or less anæmia, this fact is alone strongly indicative of that peculiar modification in the functions of the sympathetic system to which we apply the term exophthalmic goitre. The usual tonic medication employed in these cases, changes in the social state, and various moral influences, may arrest the further development of such cases, and they may never proceed to that point in the manifestation of their objective signs which will determine their proper nosological classification; yet, in their essential nature, they rest upon precisely the same change in the sympathetic system.

The quick and lasting improvement which followed galvanization of the sympathetic is another striking effect illustrative of the proper method of treating such cases. As the functional disorder of the heart, the anæmia and the other objective and subjective phenomena, are dependent on a change in the sympathetic, and, probably also, the pneumogastric, it is certainly more rational to act upon the pathological cause than to commence by treating the effects of the central lesion.

Case II.—*Palpitation and Increased Action of Heart; Goitre of Many Years' Standing; Pigmentary Discolorations of Neck and Hands; Cachexia, etc.*

Personal History.—Mrs. R., æt. 54. Dark hair and eyes, full habit, and weighing 152 pounds. A widow, mother of two children. A lady of very considerable culture, refined, and having an excellent social position. Having had ample means, she has lived a rather luxurious life, entertained largely during the life-time of her husband, and has always been engaged, often very closely, in various social and religious enterprises. Since the death of her husband, four years ago, she has had a good deal of anxiety, some business and pecuniary troubles, and has changed somewhat her mode of living. During her whole married life she has been remarkably active, cheerful in disposition, and free from bodily ailments, except the derangements to be, presently, described. She passed through the climacteric period without accident, and has had since no troubles in the pelvic viscera. There is no history of hereditary neuroses.

Disease History.—For about fifteen years she has had a considerable tumor of the thyroid, and attacks of palpitation of the heart of great violence. The size of the goitre has varied from time to time, and she has always observed a considerable enlargement during the attacks of palpitation. The paroxysms of cardiac excitement have usually lasted twenty-four hours, and the maximum number has been three each week. She has observed that her pulse-beat has, during the whole period of the existence of the cardiac trouble, been much above the usual rate. The condition of the thyroid, and the attacks of palpitation, have varied a good deal during the years in which they have existed, but a decided increase in them has been observed since the climacteric, especially within the last two years.

Status Præsens.—Mrs. R. is extremely well-preserved for her years. She is very slightly gray, has no *arcus senilis*, and the arteries at the wrist are not rigid.

Brain and Nervous System.—She has occasional attacks of vertigo, and strange sensations in the head, but suffers most from the intense beating of the carotids. During the attacks of palpitation, her sleep is disturbed by the noises in the ears and the strong, whizzing pulsations. Her special senses are normal, and there is no alteration in the sensibility to touch,

to pain and to temperature. There is no exophthalmos, and defect of coördination in the movements of the ocular globe and upper lid. Her face has, however, a somewhat startled look, but I am assured that no alteration of expression has been observed by her friends.

Circulatory System.—The action of the heart is at all times heaving. The area of cardiac dullness is increased in all directions, but there are no murmurs. Under the most favorable circumstances as to quiet, her pulse is never less than 96, and, during the paroxysms of palpitation, rises to 120 and even 140. It is irregular as to rhythm, but there are no intermittences, true or false. The sphygmographic traces exhibit the following peculiarities: the length of the pulse waves varies considerably, the summits are rounded, the dicrotism is but faintly marked. There is an obvious difference in the energy of the radial as compared with the carotid pulsations. The carotids, especially the right, at all times pulsate strongly, but in one of the paroxysms the pulsation is vehement. The thyroid has a distinct expansile movement of great force, which, during the attacks of palpitation, has the vigor of an aneurism. A loud whizzing murmur is heard when the stethoscope is applied to the thyroid. The size of the gland is greatest when the paroxysms occur, and it shrinks somewhat in the interval, but it is at all times quite voluminous. The greatest variations in size take place on the right side; the left side remains pretty constantly enlarged, and the isthmus, which is very prominent, appears to have undergone considerable hyperplasia, and is decidedly firmer than the rest of the organ.

Mrs. R. has suffered from huskiness of the voice, and the vocal register is greatly diminished, so that she is no longer able to sing. She says her voice has become "weak." She experiences also at times a sense of suffocation, and a constant feeling of weight and uneasiness about the throat. She finds herself becoming fatigued very easily, and she gets out of breath on making any slight exertion. She has no cough nor other pulmonary trouble.

Digestion and Nutrition.—Mrs. R. has a very good appetite, but she suffers from various disorders of digestion. She regurgitates her food at times, and has considerable flatulence

and acidity. Her stools are rather light in color, grayish indeed, and appear to be deficient in bile. Her urine is high-colored, charged with urates, and rather scanty than excessive. She has lately been losing a little in flesh. Within the past year she has observed a change going on in the color of the skin. Large pigment deposits are taking place about the neck and sternal region, and on the hands. The latter are symmetrically placed on the dorsal aspect of the hands, are about two inches in diameter, and are surrounded by abnormally white integument. The skin of these pigmented spots is rough, and gives off fine furfuraceous scales.

Progress of the Case.—Recognizing the case as the chronic form of exophthalmic goitre, I commenced at once the treatment by the constant current, using fifteen to thirty elements of Siemens and Halske on alternate days. The applications were made as in the case already detailed. An immediate improvement took place in the paroxysms of palpitation, and in the pulsations in the neck, and the thyroid rapidly diminished in size. The isthmus still remains hard, and is yet prominent, but the rest of the glands appear now, after four months' treatment, to be normal in size and firmness. The expansile movement of the gland has disappeared, and the unpleasant beating of the carotids is no longer felt. The disorders of digestion have almost entirely ceased, and the color of the stools is becoming normal, and she is beginning to gain slowly in weight. There has been no decided change in the abnormal pigmentation. The paroxysms of palpitation are less frequent, and much less severe. She is still under treatment, receiving, however, now, but one electrical application each week.

Commentary.—The long existence of these symptoms without the exophthalmos is remarkable, but the other symptoms are eminently characteristic. The strange look about the eyes, although not very definite, must be regarded as the beginning of a change which would finally have eventuated in exophthalmos. M. Dujardin-Beaumetz (*Bulletin Gènèral de Thèrapeutique*, Tome LXXXVII., p. 521) has recently related a case of this disease in which vitiligo existed, and which he considered a trophic change, referable, of course, to the derangement in the functions of the nervous system. The

abnormal pigmentation is an accident, and is not a necessary symptom, and may have some relation to the disturbance in the hepatic function. Various troubles of the nervous system may co-exist with exophthalmic goitre, as also various changes in the heart and great vessels, and in the thyroid, but these are complications and not essential symptoms.

The remarkable change in the goitre under the influence of the galvanic current, is an important fact. The electrolytic treatment of goitre has proved extremely disappointing. Occasionally, very brilliant results are obtained. It is very probable that in these successful cases, the thyroid was enlarged by the dilatation of its vessels, and by effusion of serum into its substance—conditions removable by galvanism. Of course, when cystic and calcareous degenerations have taken place in the thyroid, galvanism, as well as the other remedial measures, will prove futile. In the above case, the goitre proved rebellious to a long-continued course of iodine, internally and locally—a fact, in respect to true exophthalmic goitre, which Trousseau has observed, and on which he has commented in his interesting lecture on this topic.

Case III. — *Very Marked Exophthalmos of Two Years' Duration; Slight Enlargement of the Thyroid; Palpitations and Increased Pulse-rate.*

Personal History.—Mrs. B., a tall, fine looking woman of fifty years ; married, and mother of four children. She is in humble circumstances, and has suffered social reverses. She is cheerful in disposition, bustling in manner, and quick in all her movements. Her complexion is fair, eyes blue, hair dark brown. Her general health has always been good. She is still regularly menstruating, and is free from pelvic disorders of any kind.

Disease History.—After suffering a night of considerable anxiety two years ago, her friends, next day, called her attention to a protrusion of her eyes. On looking into a mirror, she was startled to observe that her countenance had a wild, staring look, due to an unnatural prominence of her eyes. Previously to this she had noticed that the action of her heart was occasionally rapid, but there had been no enlargement of the thyroid. She had also observed that she was losing flesh,

that she had become pale, and that she was much more easily fatigued than formerly. When the protrusion of the eyes occurred, she found that her vision was uncertain, and that in some positions she saw double. She consulted an eminent oculist in Cincinnati, who recognized the difficulty at once, but gave a very discouraging opinion as to the results of treatment.

Status Præsens. — When she presented herself for my opinion, I noted the following: Mrs. R. is rather pale and anæmic, but is otherwise in tolerable health. She has a marked degree of exophthalmos. When she looks forward, a rim of dead white sclerotic appears around the cornea, giving her countenance a weird aspect. When told to look down, the upper lid does not follow the movements of the globe, and a broad band of sclerotic is visible above the cornea. This is more marked in the left than in the right eye. The pupil is about the normal size, and reacts readily to the light. She suffers from occasional dizziness, and has a subjective sense of pulsation in the ears. Her special senses are otherwise normal, and motility and sensibility are entirely unaffected.

Her neck is rather full, but it is difficult to say that the thyroid is enlarged. There is no perceptible pulsation in the gland, and the carotids do not beat more energetically than in most persons under the excitement of a medical examination. She has occasional, but not frequent attacks of palpitation. The pulse is soft, but is much more rapid than normal, and appears to range at about 80 when she is in repose. The area of cardiac dullness is not increased, and there are no murmurs audible over the heart.

Her appetite is not good, her digestion is rather feeble and slow, and her bowels have a tendency to be relaxed. She is still losing flesh, and her appearance is now decidedly anæmic.

The exophthalmos is always increased at the menstrual period.

She was treated with the constant galvanic current in the manner described in the two preceding cases, and in addition had a current from five elements passed through the eyes. The applications were made twice a week for a period of six months, with the result to improve her general health, and to remove entirely the exophthalmos and the palpitations. After

several applications, the fullness of the neck disappeared for a time to return again, but it finally ceased altogether, and she has seemed to be entirely well.

Commentary.—This case illustrates the fact that the exophthalmos may be almost the only symptom. It further confirms what is stated by all the authorities, that many cases begin with great abruptness, and that the attacks, frequently, are caused by chagrin or other depressing moral emotions. The less prominence of the cardiac symptoms, and the very marked protrusion of the eyes, are also notable facts.

Cases corresponding to II. and III., are, of course, not very numerous, but Case I. is a type of a large number. I do not know that my experience has been exceptional; but it has certainly happened to me to encounter many of this kind, and I must believe, that if their nature were rightly interpreted, other physicians would meet them as frequently.

General remarks.—A disease so interesting at all points as exophthalmic goitre, invites speculation into its origin and nature. My time will not permit me to enter at any length into the consideration of these questions, but some observations as to *the name* by which this disease is known, and as to its *pathology*, may not be inappropriate.

As the cases which I have brought forward clearly enough indicate, the term *exophthalmic goitre* is not a correct designation. The exophthalmos may not exist, the thyroid may not enlarge, but the increased action of the heart to a greater or less extent, appears to be a constant phenomenon. By Graves, this disease was alluded to in connection with palpitation of the heart. Trousseau, believing that Graves was the first to describe it, called it Graves' disease. In Germany it is known as Basedow's disease, because this observer carefully studied its pathology, and indicated the seat of the morbid alterations on which the symptoms depend. By Virchow, it is treated of in connection with "*strumen*," and is entitled *struma exophthalmica.* Lebert invented the barbarous term, *tachycardia strumosa.* As no *constant* morbid changes have been observed, and as so many cases are remediable, I think it may be held that this disease is a purely functional disorder, and that the important alterations which in some instances have

been studied are accidental. Thus M. Fereol communicated to the Society of the Hospitals the particulars of a case, in which in addition to exophthalmic goitre, there existed the symptoms of a spinal sclerosis (*Bulletin Gènèral de Thèrap.*, Vol. LXXXVII., p. 473). The changes in the thyroid, *except the dilatation of the vessels*, belong to ordinary goitre, so-called. The anatomical alterations in the ganglia of the sympathetic which have been observed, are not found in all cases. The functional troubles of the heart and of the cervical vessels, do not, therefore, represent appreciable organic lesions. The disease should be named accordingly. Our systematic writers classify the disease differently. As I have already stated, Virchow (*Die krankhaften Geschwülste*, dritter band, s. 1), classifies it under the head of "*strumen*," and discusses it in connection with strumous disease of thyroid, with cretinismus, with strumous disease of pituitary body, and of the supra-renal bodies. This is the pathological stand-point. Clinicians usually regard it from the point of view of the most obvious and constant phenomenon—the hyperkinesis of the heart—and class it with the cardiac affections. Such is the arrangement of Trousseau (op. cit.) and of Jaccoud (*Traitè de Pathologie Interne*, Tome I re., p. 665), amongst the French, of Niemeyer in Germany (Am. ed.), and of Flint in our own country.

If one should undertake to assign *exophthalmic goitre* to its true nosological position, according to our present physiological knowledge, it should be placed as has been done by Eulenburg and Guttmann, amongst the disorders of the sympathetic.

That the motor influence of the heart is in part, and of the vessels, both of constriction and of dilatation, wholly derived from the sympathetic, must be admitted as established. That the pneumogastric is the regulator of the cardiac movements, seems equally positively determined. The clinical phenomena of Graves' disease, indicate that both sources of nervous supply are disordered—are depressed in function. At all events, it seems evident, that the curative value of the galvanic current is explicable on no other theory.

Art. III.—THE ATHEROMATOUS PROCESS IN ITS RELATIONS TO THE BRAIN.

Lecture delivered by Karl Hertzka.

Translated by Dr. H. Gradle.

I.—PATHOLOGICAL ANATOMY.

THE atheromatous process consists of a parenchymatous inflammation of a connective tissue membrane, usually the *intima*, or lining membrane of the arteries, which becomes thickened, and either gelatinous or cartilaginous in structure, by proliferation of the connective tissue in the form of flattened gray or yellowish elevations.

In the former case the superficial, otherwise the deepest layer of the intima, subsequently becomes the seat of fatty metamorphosis of these inflammatory products in the cells of the connective tissue lamellæ, thus giving rise, after the destruction of the cell membranes, to a semi-fluid mass, consisting of fat granules, calcium salts, crystals of cholesterine, and amorphous fragments, forming the *atheromatous abscess.* If the inner lamellæ covering the abscess is destroyed, we obtain the atheromatous ulcer. The latter, being in contact with the blood, gives rise to coagula of fibrine, on account of its uneven edges, while particles from the ulcer are carried away by the current of blood, and may thus lead to obstruction of vessels. Finally, calcification occurs by the deposition of calcium salts, or even ossification by the formation of plates of bone in the lamellæ of the connective tissue. The osseous plates extend into the interior of the vessels, and thus afford opportunity for the formation of clots. In consequence of the atheromatous process, the arteries dilate on account of the degeneration and atrophy of their muscular coat, while the smaller arteries become narrowed and even obliterated from the thickening, which generally extends also to the middle coat. The smallest arteries form miliary aneurisms, caused by the atony of their tunics and the degeneration of the middle coat, the vessel being thus enlarged by the blood-pressure.

II.—ÆTIOLOGY.

The atheromatous process may arise in rheumatism and gout, as well as in consequence of excessive indulgence in alcohol, after which Voisin* has observed atheromatous degeneration of the cerebral arteries. As Johnston (*Dublin Journal*, XLIV. (88) p. 499, Nov., 1867) has pointed out, syphilis may also be a cause of this morbid process. Heubner† has found the changes in the arterial system in syphilis similar to the atheromatous process, but does not consider them identical, since in the former case the infiltration into the *intima* shows the structure of a syphiloma. At any rate, the syphilitic alteration of the vessels consists of an endarteritis, and is analogous in its consequences to the same process starting from some other cause, as has been sufficiently shown by the observations of Clifford Albutt.‡ Finally, Traube§ has found in the retardation of the blood-current a source of sclerosis of the arteries; the white corpuscles, remaining adherent to the lining membrane extending into the same, become changed to connective tissue, and finally undergo fatty degeneration or calcification. I therefore consider the retarded velocity a cause of the endarteritis itself. This is confirmed by the almost unexceptional existence of this disease in very advanced age, in which the circulation is slackened, as well as by the coincidence of the anatomical changes just described, with retarded blood velocity and endarteritis, and finally by the observation of Ranvier and Cornil, according to whom cellular elements of the appearance of white corpuscles are seen in acute endarteritis both within the protuberances and on the free surface of the intima, apparently caught in their migration into the latter. Probably the cause of the endarteritis is to be sought in the irritation of the walls of the vessels by the stagnating blood.

* "Clinical Researches into Mental and Nervous Diseases," lectures published by Coyne, *L' Union*, Nos. 86, 110, 131, 151, 1869, and 30, 1870.

† "Ueber die Hirnerkrank. der Syphilitischen," *Arch. d. Heilk.*, 3 heft, 1870, and *Zeitschr. f. Psych.*, 1 heft, 1873.

‡ "Cases of Syphilitic Disease of the Nervous System," *St. George's Hosp. Rep.*, IV., p. 45–60, 1869.

§ "Die Entstehung des atheromatoesen Prozesses," *Berl. Klin. Wochenschrift*, Nos. 29, 31, and 32, 1871.

III.—PATHOGENESIS.

The changes which the atheromatous process brings on in the brain arise in the following manner: I have frequently mentioned that the smallest cerebral arteries become dilated by the atheromatous process and form capillary aneurisms. By this enlargement of the terminal vessels their capacity is much increased, and hyperæmia is the result; on the other hand, the augmented calibre of these vessels gives rise to a retardation of blood velocity in the same—a stasis—especially since the walls of the larger arteries are thickened, and *their* calibre hence narrowed. From this it follows that the blood will flow with increased velocity in the larger, with diminished rapidity in the smaller arteries, all of which leads to further thickening of the walls of the larger vessels. According to the latest investigations this alteration of the walls is due to an enormous multiplication of the nuclei, and hence this is in direct proportion to the obstacles to the circulation, being especially found at the points of bifurcation, at which places the thickness of the walls of the vessels is several times their calibre (Lubimoff*).

These nuclei, according to Ranvier and Cornil, are derived from the white corpuscles which have adhered to the intima and extended into the same. As was before remarked, this migration of the leucocytes is favored by a retardation of the current of blood, and accordingly Traube finds this thickening of the walls, especially in the cerebral arteries, in which the resistance to the circulation is augmented by the curvature of the carotid arteries, and by the collision between two currents of blood moving in opposite directions in the circle of Willis. For the same reason the greatest number of nuclei exists at the places of bifurcation. By the thickening of the walls the vessels are impeded in their nutritive functions, diffusion is resisted, and the nutrition of the tissues impaired, as the sign of which we find atrophy of the nervous elements. In this process the nerve-fibres lose their medulla, and consist merely

---

* "Studien ueber die Veraenderungen des geweblichen Gehirnbaues und deren Hergang bei der progressiven Paralyse der Irren," *Virchow's Arch.*, LVII., 3 and 4 heft, 1875.

of an axis-cylinder. Fat granules appear within the cells, and, becoming confluent, form fat globules, thus leading to fatty degeneration of the cells, which are changed into detritus capable of resorption, and thus softening occurs.

This process of softening, however, is favored by another circumstance — by the proliferation of the connective tissue. According to Meynert, the vessels are caused by the hyperæmia to fill out the surrounding perivascular spaces, and thus prevent the circulation in the finest lymphatic vessels. The interstitial fluid must therefore expand other passages, especially the connective tissue cells representing the terminal lymphatic network.

These cells thus expanded, enlarge, and undergo a division of the nuclei, and finally of the cell itself. The formative irritation extends also from the walls of the vessels to the subjacent tissue. At the border of the *foyer*, there appears, according to Rindfleisch,* a moderate increase in the number of nuclei, which are interspersed in regular intervals between the nerve-fibres. On separating the still intact fibres, elastic fibres are found between them, which are derived from the amorphous substance of the neuroglia. The elastic fibres form an irregular network, containing a large number of dividing nuclei, and surrounding the nerve-cells, the atrophy of which is either induced, or an already existing degeneration favored. After complete fatty degeneration of the nerve-cells, the elastic net is drawn tighter and tighter around the detritus, the absorption of which is thus favored. When all the fluid has been absorbed, the network becomes still denser, and the nervous tissue is substituted by a dense leather-like tissue, and *sclerosis* is established.

Sclerosis occurs mostly in the subcortical medullary layer of the brain, which is explained by Lubimoff by the obstructed circulation from the course of the vessels, since the vessels of the pia mater enter and pass through the cortical layer vertically, while they pursue a horizontal course in the white

---

* "Histologisches Detail zu der grauen Degeneration von Gehirn und Rueckenmark (zugleich ein Beitrag zu der Lehre von der Entstehung und Verwandlung der Zelle"), *Virchow's Archiv*, 1863, bd. XXVI., heft 5 and 6, p. 474.

matter. An obstruction of the circulation is thus caused, favoring sclerosis of the arteries. Since we have seen that sclerosis of the tissues is a secondary phenomenon in the atheromatous process, we are, therefore, not surprised to find the sclerosis most decidedly developed in the vicinity of the vessels, and especially the connective tissue cells most numerous at the junction of two convolutions, since a larger number of vessels enter the gray substance at the floor of such a furrow.

These are the secondary alterations caused in the brain by the atheromatous degeneration of cerebral vessels. We must yet consider the disturbances arising in consequence of long duration of the process and special conditions attending the same. Of the latter description, are the changes occurring in embolism and thrombosis of cerebral arteries. The obliteration of the vessels is mainly the result of the numerous coagula of fibrine, caused by the uneven elevations of the intima. When one of these clots is carried along from a larger into a smaller vessel, an embolism results, the influence of which on the brain, by interruption of the supply of nutritive material to the parts supplied by that vessel, will be similar to the effect we have previously seen from congestive stasis; with the difference that in the former case the loss of function of the parts controlled by that part of the brain will be sudden. The pathological result, however, softening, etc., will be the same in both cases, notwithstanding the difference in the time of development and cause (in one case anæmia, in the other congestion and stasis), provided a collateral circulation is not established. The latter, however, does usually occur in another form of occlusion of the vessels—in thrombosis, as caused by the gradual formation of fixed coagula, leading finally to obliteration of the calibre. Accordingly, thrombosis shows a more gradual development of the different phenomena, and still the same pathological results; since, notwithstanding the occurrence of a collateral circulation, the same textural changes will take place; as an involvement of all cerebral arteries in the atheromatous process, renders them all incompetent for the nutrition of the parts proper to them, and much less for the additional nutrition of the parts supplied by another now

obliterated vessel. These occlusions can be occasioned by other products as well as the depositions of fibrine. Thus, embolisms may consist also of necrosed fragments of the atheromatous walls of vessels, pigmentary agglutinations, etc., and not rarely do we find thrombi formed of the products of degenerated blood-corpuscles, as may be proven by the anatomical characters and the presence of pigment. Though the disturbances of nutrition caused by the occlusion are the same as those resulting from the atheroma itself, I still wish to point out this difference, that in the former cases the textural changes are partial, and occur at a time before the atheroma itself can, as yet, produce the same in the whole brain.

Another consequence of the atheromatous process is, finally—as we have already shown for the smaller arteries—the dilatation, either circumscribed or involving the vessel to some distance—the ordinary aneurism; or when the atheromatous inner and middle coats have burst, and the blood dissects off the adventitia, which finally ruptures also—the dissecting aneurism. As another explanation for the occurrence of some aneurisms, Ogle * found in his experiments, that in occlusion of a vessel (embolism or thrombosis), the plug of fibrine is wedged in tighter by the *vis a tergo* of the blood, while the elastic walls of the vessel become distended by the lateral pressure of the blood; hereupon they lose their contractility, especially when they are atheromatous or otherwise diseased; and when the surrounding tissues are very yielding, as in the brain, an aneurism is formed. The effects of an aneurism are like those of a cerebral tumor; very variable with the size and extent, as well as the locality of the same.

---

* John W. Ogle, *On the formation of aneurisms in connection with embolism or arterial thrombosis.* London: 1865. Benj. Pardon, pp. 8.

Art. IV.—ON THE HYPODERMIC ADMINISTRATION OF ERGOTINE IN CERTAIN CASES OF ACUTE MANIA.

By Dr. A. H. Von Andel,
Director and Physician to the Asylum at Zutphen.

Translated from the Allg. Zeitschrift fuer Psychiatrie, LXII., 2 Hft.*

IT is with diffidence that I call the attention of this honorable assemblage for a short time, to one of the most difficult problems in the treatment of insanity, namely, the therapeutic management of mania, and especially those cases that may be designated acute delirium, the better to distinguish them from other forms, although by this name only a rather comprehensive conception is indicated. The cases which I to-day aim to describe, are those which, after a short period of incubation of a few weeks, during which the most striking symptoms are only a certain degree of restlessness and emotional disturbance, explode, so to speak, in a sudden attack of mania. The physical symptoms then observed, besides some general increase of bodily temperature, are principally those of congestion of the head; reddening of the visage, strengthening of the pulse in the carotids, injection of the conjunctivæ and contracted pupils, indicating hyperæmia of the cerebral vessels and membranes.

It is evident that this kind of insanity forms a special group, within that of acute mania, and passes into others whose causes must be sought in other pathological conditions, but in this paper we shall limit ourselves to that form first named. Which one of us has not felt more than usually desirous in the presence of such painful accidents, to afford a radical help against such a dangerous condition, both for the patient and his surroundings.

No one will gainsay the absolute necessity, in such cases, of isolation in an asylum; and from this fact, the need of direct

---

* An Address delivered at the Twenty-fifth Meeting of the Niederlandischen Verein fuer Heilkunde, June 24, 1874.

therapeutic interference on the part of the family physician is less urgent; but unhappily many difficulties of a social kind stand in the way as soon as incarceration in an asylum becomes the question. In short, not infrequently, both the family practitioner and the asylum physician is necessitated to make use of drugs in addition to other proper therapeutic measures.

The necessity of obtaining rest for the furious patient if the mania is already of some days' duration, is of such importance, both on account of the patient himself and his family and attendants in private practice, that the physician can hardly be blamed for employing even dubious remedies rather than none at all. Many have recourse in such cases to the use of opium and its preparations, a kind of treatment against which sufficient warning can scarcely be given. Prolonged baths are difficult of application in private practice. One of the few agents that has been employed on rational grounds in such cases, is tartar emetic in large doses. Its injurious influence on the digestive organs is well known, and every alienist can recollect cases in asylums in which, although the cerebral congestion was moderated, and the functions of the digestive organs deranged by the long-continued employment of this agent, still the mania remained uncured. That the employment of this heroic method is often begun with some reluctance, and that it is not considered too lightly by any one, is demonstrated among other things, by the literature of "No Restraint," in which German alienists make the charge against their English colleagues, that they have substituted a pharmaceutical means of restraint for their patients for a mechanical one. Every new remedial agent that lacks this objection, and the employment of which is susceptible of a rational explanation, deserves in the highest degree our attention, and I may therefore ask that you will follow me for a little in the exposition of the results I have obtained from the hypodermic administration of ergotine.

We stand here on good physiological grounds. As has frequently been said (since the neuropathic views of psychoses are being more and more generally adopted), psychiatry (apart from its own special features) is a part of neuropathology, and it is just as true the consciousness of this family relation ought

to be kept constantly in mind, especially in a period like the present, when the sister science of neurology has made such prodigious advances. Hence we should study every new step in advance that it makes, either theoretical or practical, in order to apply it as far as possible in the department of psychiatry.

The use of ergotine in migraine and other morbid conditions long ago attracted our attention, and we have employed it internally, especially since the papers of Crichton Browne, who used it in certain cases of epileptic insanity and chronic mania, but without noticeable results.

Brown-Sequard observed contraction of the vessels of the cerebral coats after injection of ergotine. I presume his experiments are well known to you, as are also those of our colleague Hermanides, who demonstrated the fact that ergotine employed in this manner can produce anæmia of the brain.* We have ourselves experimented with this agent in the cases described.

We first employed ergotine in mania in the spring of 1873. We used the preparation made by the apothecary, Ten Bosch, of Herzogenbusch, which had been decried by Herr Landmann, a practicing physician of Heilvoirt, on account of its slight local disadvantageous influence.

℞.—Ergotine (Ten Bosch),	gramme i.
Glycerine,	
Sp. Vini Rect., *aa*	grammes v.

M. D. S. pro injectionibus subcutaneis, ten per cent.

An opportunity for the subcutaneous administration of ergotine, was found in a case of epileptic mania in our asylum, that had been treated there two years previously for the same trouble, and at that time the usual treatment with ice, leeches, bromide of potassium, subcutaneous injections of morphine, etc., had been used without special results during the long duration of the disease. We thought on the grounds detailed above, that we might expect favorable results from the use of ergotine, while we had at the same time no fear of local inflammations, because others had not met with them from its employment in cases of post-partum hæmorrhage. Our patient, as

* The author has recently confirmed these facts by his own observations on curarized frogs.

well as another girl who suffered from the same disease a little later, was in the so-called *status epilepticus,* from which we apprehended death by exhaustion. In both cases we obtained good results from the use of the ergotine, especially in the first one, in which we had good reasons to attribute the favorable course of the disease to the drug, because the attack on this occasion, although it commenced with just as severe symptoms, scarcely lasted a third of the time it had on the previous one.

Since that time, we have repeatedly had occasion in the Zutphen asylum, for the hypodermic employment of ergotine in combating hyperæmia of the central nervous system. The results usually were diminution of the excitement, the ravings, outcries and fury gradually ceased, and the patient, although crazed, was at least more manageable than before, and sometimes the injection was followed by a refreshing sleep. As we have said these cases do not usually occur at the asylums—the journey to the institution usually puts off the symptoms to some extent. One of our cases in which this did not occur, and moreover, one of our most striking ones, I will detail in brief:

A seaman, forty years old, married, and father of two children, and in good outward circumstances. In spite of a choleric temperament, he was noted for his courtesy in intercourse with others. He had suffered previously from periods of melancholic derangement connected with digestive disorders. He had always been healthy, had no hereditary taint, and was physically well developed. Under the influence of some irritating circumstances, he broke out in April, 1874, in such a severe attack of furious mania, that the third day after the onset, when he was taken to the asylum, four powerful men could scarcely control him. All the above described symptoms of cerebral congestion were present in his case. On the evening of the first day, ice was applied to his head; he was isolated, watched, etc.

2d day; morning. The patient is compos mentis; no perceptible nervous disorder. Pulse 86. Evening, the same.

3d day. Early in the morning occurred a repetition of the symptoms. Pulse 108. Temperature increased. Application of ice, and other treatment as before.

As on the following day, no decrease in the symptoms was observed, a subcutaneous injection of 100 mgm. (= 1½ grs.) ergotine was made, and repeated again in the evening.

5th day. The severity of the symptoms has decreased; remissions appear. Pulse 108; temperature still high. The hypodermic use of ergotine was twice repeated, and from time to time ice fomentations were employed. Then followed three days of mental rest, the symptoms of cerebral congestion all having disappeared. The patient walks quietly in the garden during the day.

On the ninth day, the attack again came on, and the same treatment with the hypodermic use of ergotine was employed. Four days later the attack had completely disappeared, and he has remained perfectly well to this day.

In the whole fourteen days, fifteen injections of ergotine were administered. It was the only case in our practice in which small abscesses formed at the point of injection, though these caused but little inconvenience. They need not be considered as a counter-indication in such a terrible form of disease. In our other cases the local effects were either that the ergotine was quickly absorbed, or circumscribed swelling appeared, which slowly diminished and was slightly painful on pressure. We noticed no other painful or disagreeable consequences of ergotine injection.

In conclusion, I may notice the possible objection, that in our cases the cure can not be ascribed alone to the ergotine, since ice was simultaneously employed. I reply to this: 1st, that before in similar cases, the ice poultice was inefficacious; and 2d, that if ergotine alone had been used, it would not have been justifiable, on purely empirical grounds, to attribute the cure solely to it. We need still further experiments with this agent, where possible, aided by the thermometer and sphygmograph. The subject, as far as I know, is still new, and has been investigated by no one. Whether under such circumstances, much importance can be attributed to sphygmographic observations, must be doubted. The obstinate resistance of the patients did not permit us to make any sufficiently accurate thermometric readings. That this is frequently impossible in such cases, is proved among others by the recent work, "*Sections Ergebnisse bei Geisteskranken nebst Kranhheitsgeschichten und Epicrisen*," of Schuele, physician at Illenau, 1873.

American Neurological Association.

THE American Neurological Association was organized pursuant to the following letter of invitation:

NEW YORK, December 15th, 1874.

Dear Sir: — It is contemplated to institute a Society, to be called THE AMERICAN NEUROLOGICAL ASSOCIATION, to be devoted, as its name imports, to the cultivation of Neurological Science, in its normal and pathological relations. The number of members not to exceed fifty.

The Association will meet annually and continue in session several days.

It is proposed to hold the first meeting in the City of New York, on Wednesday, the second day of June, 1875.

You are respectfully invited to participate in this meeting for organization, and to signify your acceptance or declination of this invitation to either of the undersigned at your earliest convenience.

Respectfully,

Your Obedient Servants,

WILLIAM A. HAMMOND, M.D.,
43 West 54th St., New York.

ROBERTS BARTHOLOW, M.D.,
120 West 7th St., Cincinnati.

MEREDITH CLYMER, M.D.,
65 West 38th St., New York.

J. S. JEWELL, M.D.,
57 Washington St., Chicago, Ill.

E. C. SEGUIN, M.D.,
17 East 21st St., New York.

JAMES J. PUTNAM, M.D.,
6 Park Square, Boston.

T. M. B. CROSS, M.D.,
37 West 21st St., New York.

The following named physicians accepted the invitation:

S. Weir Mitchell, Philadelphia; J. K. Bauduy, St. Louis; F. D. Lente, Cold Spring, N.Y.; J. J. Mason, N.Y.; John C. Shaw, Brooklyn; F. P. Kinnicutt, New York; A. D. Rockwell, New York; D. B. St. John Roosa, New York; A. McL. Hamilton, New York; S. G. Webber, Boston; D. F. Lincoln, Boston; E. G. Loring, New York; J. C. Dalton, New York; E. R. Hun, Albany; E. H. Clarke, Boston; H. D. Schmidt, New Orleans; S. M. Burnett, Knoxville, Tenn.; John Van Bibber, Baltimore; J. W. S. Arnold, New York; Robert T. Edes, Boston; N. B. Emerson, New York; T. A. McBride, New York; F. T. Miles, Baltimore; William Pepper, Philadelphia; H. C. Wood, Philadelphia; Walter Hay, Chicago; H. M. Bannister, Chicago; J. S. Lombard, New York. These, with the signers of the call, make up a total of thirty-five original members.

The Committee on Organization in New York, composed of Drs. Clymer, Hammond and Seguin, made the arrangements necessary for the meeting, choosing as a place of meeting, the Lecture Room of the Young Men's Christian Association Hall, corner of Fourth avenue and Twenty-Third street.

First session.—First meeting, June 2d. The Association was called to order by the Secretary of the Committee on Organization, Dr. Seguin, at 2 o'clock, P.M., Wednesday, June 2d. The following members were present:

Drs. Clymer, Hammond, Jewell, Putnam, Cross, Lente, Mason, Kinnicutt, Rockwell, Hamilton, Webber, Lincoln, Hun, Van Bibber, Emerson, McBride, Hay, and Seguin.

On motion of Dr. Hammond, Dr. J. S. Jewell, of Chicago, was elected temporary Chairman, and at once entered upon his duties.

The following resolution was then offered by Dr. McBride:

"It being the sense of this Association that its proceedings should be reserved for the profession and the medical press, be it

Resolved, That reporters from non-medical journals be excluded from the meetings of the Association; and that any information requested by the press, be furnished by the Secretary, under the guidance of the officers of the Association."

This motion was seconded by Dr. Putnam, and after some discussion by Drs. Hay, Hammond, Hamilton, and others, was adopted.

Dr. Clymer having in charge the draft of Constitution and By-Laws, prepared by the Committee on Organization, submitted these documents.

The Constitution and By-Laws were read, article by article, by the Secretary, discussed by the Association, and with slight modification, adopted. They are as follows:

CONSTITUTION.

I. This Association shall be named and known as "The American Neurological Association."

II. It is established to promote the study of Neurological Science in all its departments.

III. There shall be two sorts of members, namely, active members—not exceeding at any one time fifty in number, and who shall be at the time of their election residents of the United States—and foreign associate members, not exceeding at any one time twenty-five in number, and who shall be non-residents. Active and foreign associate members shall be elected by ballot on the recommendation of the Council, on one day's previous notice of such ballot, by a majority of all the members present.

Provided, That no one shall be eligible for active membership, unless he has previously submitted a paper on some subject connected with Neurological Science, which paper shall be referred to the Council for examination and report. Active members only shall be entitled to vote at any meeting, or be eligible to any office.

IV. The officers of the Association shall be a President, two Vice-Presidents, a Corresponding Secretary, a Recording Secretary, who shall perform the duties of Treasurer, and a Curator. They shall be nominated by a Committee of Nominations of five members, appointed by the President on the first day of the annual session, and who shall report on the day following, immediately after which the election shall take place. The election shall be by ballot, and the person who shall have the

greatest number of votes shall be declared elected to the office for which he may be a candidate.

In case of a vacancy occurring in any office between the dates of the annual election, it shall be filled by the Council until the next annual election.

The officers shall enter upon their duties immediately after the organization of the annual session next after their election, and shall hold office for one year.

Provided, That the officers of the first session shall be elected immediately after the organization of the Association, and shall hold their offices until the election at the second annual session.

V. The Council shall consist of the officers of the Association, shall manage the affairs of the Association, subject to the Constitution and By-laws, and shall report to the Association at large at each annual session.

VI. The annual session of the Association shall be held on the first Wednesday in June in each year, and at such place as shall be designated by the Association at the previous annual session, and shall continue for three days, unless the time be extended by a vote of the Association.

VII. This Constitution may be amended by a two-thirds vote of all the members present, at any annual session, provided that notice of said proposed amendment in writing be given at the annual session immediately preceding.

BY-LAWS.

1. Each and every member of the Association shall pay annually to the Recording Secretary the sum of five dollars.

No member who shall be in arrears for one year shall be entitled to vote, or be eligible to any office in the Association.

2. The officers of the Association shall discharge the duties belonging to their respective offices. The President shall be ex-officio chairman of the Council.

3. The Council shall meet as often as the business of the Association may require. They shall keep a record of their proceedings, which shall be read at the annual session of the Association, and it shall be their duty to present business for

the action of the Association. They shall not have power to make the Association liable for any debts exceeding in total the sum of one hundred dollars in the course of any one year, unless specially authorized to do so by a recorded vote of the Association.

4. The order of business at each meeting of the Association shall be as follows: 1, calling to order; 2, reading minutes of last meeting; 3, reports of committees; 4, miscellaneous business; 5, reading of papers, presentation of papers, discussion, etc.

5. The titles of all papers to be read at any annual session shall be forwarded to the Corresponding Secretary not later than one month before the first day of the session. All papers that may be read before the Asssociation, and accepted, shall become the property of the Association, and their publication shall be under the control of the Council. All publication of the meetings of the Association shall be under the direction of the Council.

6. These By-Laws, or any one or more of them, may be amended, or repealed, or suspended by a two-thirds vote of all the members present at any meeting during an annual session, provided notice in writing of any proposed amendment or repeal has been given at the meeting immediately preceding the one at which the motion is made and the vote taken.

Dr. Clymer then offered the following amendment:

"Provided that nothing in the pending Constitution and By-Laws shall prevent the immediate organization of this Association by the appointment of a Committee on Nominations, and the election of officers by ballot immediately after their report." Adopted.

In accordance with the provisions of the Constitution, Dr. Jewell, Chairman, appointed the following nominating committee: Drs. Putnam, Lente, Hun, Hay, Seguin.

In a short time Dr. Putnam, Chairman of the Committee, presented the following report:

The Committee recommend for President, Dr. Mitchell, of Philadelphia; for First Vice-President, Dr. Jewell, of Chicago; for Second Vice-President, Dr. Clarke, of Boston; for Corresponding Secretary, Dr. Mason, of New York; for Recording

Secretary and Treasurer, Dr. Seguin, of New York ; for Curator, Dr. Arnold, of New York.

On motion of Dr. Hammond, the Secretary *pro tem.* was directed to cast the vote of the Association for these nominees. This was done, and the Chairman declared them duly elected.

In the absence of the President-elect, the First Vice-President, Dr. Jewell, took the chair, and, in a few felicitous words, thanked the Association.

The following note was then read by the Secretary :

"43 West 54th Street, N.Y.

"Dr. Hammond requests the pleasure of the company of the members of the American Neurological Association, on Thursday evening, at 8 o'clock, P.M."

This invitation was accepted, with thanks by Dr. Jewell, on behalf of the Association.

The reading of the first paper by Dr. Webber, of Boston, entitled

CONTRIBUTIONS TO THE STUDY OF MYELITIS.

The paper consisted essentially in the report of two cases, with autopsies and a description of the changes which had taken place in the tissues of the spinal cord, as observed under the microscope. They were regarded as cases—especially the first—which would contribute to prove that other parts than the anterior ganglion cells are affected, either primarily or secondarily, in a certain class of cases. From the clinical history, these cases were regarded as belonging properly under the class cited by Dr. E. C. Seguin, in a paper read before the New York Academy of Medicine, in November, 1874, under the head of "Acute and Sub-acute Spinal Paralysis, or Inflammation of the Kinesodic Tract of the Spinal Cord." They were not, however, looked upon as due primarily to lesion of the anterior cornua exclusively, and atrophy of the nerve-cells there situated ; but the writer was inclined to believe that the first stage is one of congestion. The changes found were regarded as due to inflammation and destruction of the nervous elements of the spinal cord, fibres, and ganglion cells. In the muscles all forms of changes were observed, except the amyloid.

Discussion on Dr. Webber's paper was postponed until the morrow.

On motion of Dr. Lente, a committee was appointed to arrange a place for the reading of papers, and the presentation of specimens. The President appointed Drs. Mason, Hay and the Secretary.

On motion, the Association adjourned to meet at 2 P.M. on June 3d.

SECOND MEETING, JUNE 3D.

The acting President, Dr. Jewell, called the Association to order at 2:30 P.M. The minutes of the first meeting were read by the Secretary, and after some slight corrections, adopted.

There were present: Drs. Lincoln, Mason, Rockwell, Putnam, Webber, Emerson, Lente, Hammond, Clymer, Van Bibber, Miles, Cross, Jewell, McBride, Kinnicutt, Loring, Hamilton, Seguin.

DISCUSSION ON MYELITIS.

The first order of business being the discussion upon the paper read by Dr. Webber at the first session,

Dr. Putnam, of Boston, remarked that he knew of no absolute sign which indicated the presence of congestion of the spinal cord, and inquired of Dr. Webber by what signs he would recognize that condition, and also whether congestion can exist to any extent in the spinal cord without being accompanied by nutritive changes? In other words, can we by any signs tell where congestion ceases, and actual change in structure begins?

Dr. Webber, of Boston, replied that he supposed it would be exceedingly difficult to determine exactly where congestion ceases and inflammation begins. The physiological action of the spinal cord is such, that its functions are more easily deranged by slight influences, as a deficient or increased supply of blood, than some other organs, but he knew of no means to decide whether mere congestion or organic change is present at any given time. If the patient has symptoms referable to one or other condition, and recovers entirely, no symptoms

remaining, we are perhaps justified in assuming that it was congestion that gave rise to these symptoms; but if any disturbance of function continues permanently, it is probable that the change which took place was organic.

Dr. Putnam inquired still further whether the blood can be increased in the spinal cord without such increase being preceded by some influence exerted upon the cord? He was not aware of any absolute proof of this, although he has no doubt that the blood of the spinal cord varies in amount, and varies according to the influences acting upon the vaso-motor system.

Dr. Hammond, of New York, remarked that we have some proof in the way of analogy. It is a well-known fact that emotions influence the amount of blood over the face and chest, and what emotion can do to the face and chest it may do to the spinal cord. There is no difficulty in adopting the view that the brain and spinal cord may be subject to local congestion, but the actual proof is a far different question.

Dr. Miles, of Baltimore, remarked that from the experiments of Van der Kolk, it was quite probable a certain degree of hyperæmia was necessary to the proper performance of function, and that activity of function might accordingly indicate, perhaps to some extent, the amount of hyperæmia present; but he was of the opinion that it is not possible to draw a line of distinction to an extent which will enable us to determine where congestion ends and inflammation begins.

Dr. E. C. Seguin, of New York, remarked that the two important points in the paper of Dr. Webber were, *first*, the pathological anatomy and possible connection between the symptoms and the lesions. For it is by such study that we are enabled to connect certain symptoms with certain morbid changes. In the second place he regarded the two cases cited as radically different in nature. The second was one of localized myelitis, involving every part of the cord. The first case had some very peculiar features, such as the wasting of the muscles, and the absence of alteration in the nutrition of the skin, especially upon the buttocks, and he regarded it as a case of spinal paralysis of the adult. The diffuse myelitis in the white and gray matter of the cord he regarded as a valuable point in the pathological anatomy of the case.

Dr. Clymer, of New York, related a case of acute spinal paralysis, with the view of drawing special attention to the treatment adopted. The patient suffered at first from general malaise, with marked feebleness of the lower extremities, and slight feebleness of the left arm, and after five or six days he was completely unable to get out of bed. His tongue was coated and dry, skin dry, pulse 90, numbness, and tingling of the extremities, etc. At first sight the case appeared like one of typhoid fever, but it lacked the peculiar physiognomy, the eruption, gurgling in the right iliac fossa, etc. The patient had been training himself for a foot-race, and had received a sudden check of perspiration.

Regarding it as a case of spinal congestion, he was cupped largely and freely over the cervical and lumbar vertebræ. On the following day the cupping was repeated, and followed by free blistering. The result was that the acute symptoms disappeared, all fears of fever were dispelled, but the paralysis remained in the lower extremities. The cupping was occasionally repeated, with some counter irritation, and after some weeks the down current was applied through the cord to the lower extremities, and the patient rapidly improved in his ability to walk. The atrophy of the glutei muscles, and the muscles of the left arm and the deltoid, was very decided. The patient is now able to walk without much imperfection in his gait. He was of the opinion that the case was one of congestion of the spinal cord, accompanied by some destruction of the cells in the anterior cornua, and believed that it would have gone on to the production of more serious changes, had not the treatment been antiphlogistic.

The second order of business was the report of a case of

SPINAL PARALYSIS WITH PARTIAL RECOVERY—BY DR. MILES, OF BALTIMORE.

The patient had been under the influence of excessive venereal excitement, and had taken a sudden cold, and almost immediately found his left side partially paralyzed. In this condition, but with great difficulty, he came to Baltimore, and the day following his arrival the other side became partially paralyzed. The third day he was absolutely paralyzed, except

the muscles of the face and the muscles of deglutition. He was a living face with a body absolutely dead, to all appearance. He suffered no inconvenience or pain. Sensibility remained perfect, and the sphincters were sound. The muscles responded to mechanical irritation as readily as normal. He remained in this condition for three or four days, when slight motion was noticed in the fingers, which gradually increased, and the movements of the arms were soon restored, and power gradually returned to all the muscles.

The treatment consisted in the use of cups along the back, iodide of potassium, bichloride of mercury, and the faradic current. No single muscle was left paralyzed.

When seen lately there was noticed to be a slight imperfection in walking, but he can walk without a cane or crutch. The interossei muscles of the hands and feet showed atrophy. The case illustrates how perfect paralysis of this sort may be, and every muscle recover from its paralyzed condition. In the present case it is probable that the congestion has left its mark, and perhaps in certain places in the cord minute lesions of a hæmorrhagic character have been produced.

Dr. Hammond asked whether reflex excitability was present or not.

Dr. Miles replied that there was none.

Dr. Hammond remarked that he believed all would agree that such cases of paralysis generally recover under appropriate treatment. The more sudden and intense the paralysis is in a case of that nature the more apt it is to get well.

He then related a case where the patient fell perfectly paralyzed in every limb, and in that condition was brought to the city. When first seen he also had facial paralysis. There was no evidence of syphilis. He was treated with large doses of iodide of potassium, bichloride of mercury, the galvanic current, where it would act, and the fluid extract of ergot. The patient recovered completely, and was as well as any one. He regarded the case as one of congestion, with very great effusion, and that with the absorption of the effused fluid the congested condition of the vessels disappeared, and the recovery naturally followed.

In Dr. Miles' case there seems to have been some more per-

manent lesion, but in my case the muscles are perfect, and the patient moved about perfectly well within six weeks after the attack.

ATHETOSIS.

Dr. Hammond, of New York, presented a case of this kind occurring in a man who has been the subject of epileptic paroxysms, and a hard drinker. It was the original case upon which was based the description he had given of the disease. The motions of the fingers *continue through the night*, and in this respect the description given must be modified.

Dr. Clymer mentioned a case seen more than thirty years ago, but at that time it was supposed to be choreic in nature.

Dr. Jewell referred to a case accidentally seen, occurring in a girl who was epileptic. These movements had been going on for two or three years in the right hand, and were then slightly apparent in the left hand.

Dr. Hay referred to a case accidentally seen, of which he hoped to be able to obtain a history.

Dr. Cross, of New York, referred to two cases of the disease where the movements were upon the left side, and were not preceded by epilepsy. In one case the patient was a female, and the movements were in the feet as well as in the hand.

Dr. E. C. Seguin reported a case occurring in a female 22 years of age, where the condition had been developed after infantile hemiplegia.

He also mentioned the fact that he had noticed in two cases what he had termed the athetosis-like state. In these cases, both boys, one about four and the other seven or eight years of age, there was hemiplegia of cerebral origin, and there was present a certain degree of secondary contraction in the paralyzed parts. They were unable to bend the contracted fingers, when asked to do so, but there was an involuntary spasmodic action by means of which the fingers were opened, and opened beyond the normal extension. In the case of the girl there was hypertrophy of the muscles.

Dr. Webber inquired whether the child opened the non-paralyzed hand at the same time the paralyzed one was opened.

Dr. Seguin replied, that in one patient there was no such sympathetic movement in the opposite hand.

Dr. Van Bibber reported a case of right hemiplegia in a patient five years of age, in which complete recovery did not occur. There was present some secondary contraction, and also the condition referred to by Dr. Seguin. The muscles were hypertrophied in a remarkable manner.

TREATMENT OF PARALYZED MUSCLES BY ELASTIC RELAXATION.

Dr. Van Bibber, of Baltimore, read a paper upon the above subject, in which he set forth the physiological conditions which underlie the advantages claimed for this method of treating paralyzed muscles. The views of the writer can be found in the May number of the *New York Medical Journal* for 1873, together with cases.

Drs. Seguin and Hammond bore testimony to the efficacy of this plan of treating paralyzed muscles, and regarded it as of special benefit in the treatment of facial paralysis and paralysis from lead-poisoning.

Dr. N. B. Emerson, of New York, referred to the relation existing between electro-muscular contractility and tension as a possible explanation of the benefit derived from this plan of treatment. When the origin and insertion of a muscle are approximated, a much less amount of electric influence is required to cause muscular contraction.

Dr. Seguin regarded this as a point of considerable practical importance, and reported a case in which no response could be obtained to the galvanic current from the muscles in the anterior tibial region, and it was suspected that the stretched condition of the muscles resulting from a double talipes equinus was the reason why no response could be obtained. Tenotomy was performed, and on the fourth day after the operation, the muscles having been relaxed, there were distinct muscular contractions in response to the galvanic current, which continued to improve. The operation was done in 1871.

INJURY OF THE BRACHIAL PLEXUS.

Dr. Putnam, of Boston, reported a case in which the arm had been forced into extreme extension by the premature dis-

charge of a cannon. The arm was severely burned, but there was neither fracture nor dislocation. Complete discoloration of the skin took place, and the limb became blue. Almost complete recovery has now taken place, as far as the ulnar nerves are concerned, and as far as sensation goes in the parts supplied by musculo-spiral. The only parts now remaining cyanotic, are those supplied by the median nerve. It was interesting to notice that when the cyanotic parts were rubbed very lightly, that the discoloration would disappear, and the skin remain of its natural color for some time, showing that some influence was exerted upon the vaso-motor nerves by the manipulation, and is probably due to reflex action through the median nerve. The disappearance of discoloration would seem to indicate dilatation rather than contraction of the vaso-motor nerves. The principal point of interest was the extent of the injury done to the brachial plexus by forcible extension of the arm. Galvanic current is the only treatment resorted to.

Dr. Hay, of Chicago, referred to a case of injury to the brachial plexus without discoloration or fracture. The lady fell from a balcony, striking upon her extended left hand and arm; there was some numbness and dull pain about the arm, which was so aggravated, after about forty-eight hours, that a surgeon was called, upon the supposition that some dislocation or injury of surgical character had been sustained which had been unrecognized. At the end of eight weeks the arm was entirely motionless, fingers extended and paralyzed and in close apposition with each other, and the patient suffered severe pain between the shoulders, in the neck, arm, forearm, and down the fingers. After eleven weeks had elapsed, considerable atrophy of muscles was manifest, and the forearm had diminished in size one-third; interossei muscles disappeared rapidly; skin became white and glistening.

Notwithstanding the severe pain upon motion, there was anæsthesia. The treatment consisted of blisters along the course of the cervical and brachial plexuses, with strychnia and cod-liver oil, etc. An almost complete recovery took place.

Dr. Jewell referred to the reflex vaso-motor action as an interesting point in Dr. Putnam's case, and regarded the case as one of an instructive class, illustrating the ease with which

a sensory impression can be conveyed along a cerebro-spinal sensory nerve if you please to a vaso-motor centre, and from thence sent out along vaso-motor nerves so as to affect the action of the vessels of a part.

Dr. E. C. Seguin, of New York, reported additional cases of injury of brachial plexus, and drew special attention to a point in diagnosis, the observance of a symptom which has escaped observation entirely in this country, and has been mentioned by only one or two observers abroad. He had based this symptom upon observations made in two cases. The symptom which attracted attention was contraction of the pupil upon the same side of the injury to the brachial plexus. In both cases, the pupil in a moderate light did not dilate to the full extent, and resembled the pupil of the general paralysis of the insane, or of locomotor ataxia at certain stages. It was a fixed and moderately contracted pupil. This paralysis represents in a moderate degree the paralysis of the sympathetic nervous system, and was probably produced in the cilio-spinal centre and its ramifications upward. The exact mechanism of this pupillary contraction is obscure, but he was inclined to the opinion that it could be most satisfactorily explained upon the inhibitory principle.

This symptom may be of possible service in making out obscure cases of injury about the shoulder. It would be interesting also to determine the exact point in the brachial plexus, an injury of which will produce this distant vaso-motor paralysis.

Dr. Hammond inquired whether contraction had been noticed accompanying paralysis induced by *pressure* upon the brachial plexus. He related one case where paralysis was produced in that manner, and the pupil upon the affected side was permanently contracted either in the light or dark. Motion in the arm was almost entirely destroyed, and sensibility to a great extent. He regarded the case as interesting from the fact that probably there was no tearing of the structures, but the effects were due alone to pressure.

Dr. Seguin remarked that the case just related goes to strengthen the proposition, that contraction of the pupil is evidence of actual gross injury. He was of the opinion that

the pressure produced by the back of the chair caused a separation of the myelin; there may have been severance of the axis cylinders. The non-recovery of the patient shows that there must have been secondary degeneration beyond the point of severance. The physiological separation in such cases is the same, whether produced by pressure, or by laceration, or by the knife.

Dr. McBride referred to a case similar to that mentioned by Dr. Hay, in which there was no pupillary contraction present. He also referred to a case where a large tumor was present upon the side of the chest, and contraction of pupil was noticed; and another case of old dislocation of the shoulder accompanied by small pupil upon the same side.

Dr. Kinnicutt recalled a case in which the symptoms indicated severe injury to the brachial plexus, and yet there was no pupillary contraction present.

Dr. Putnam referred to the fact that inequalities of the pupil had been noticed in connection with various diseases of the chest.

Dr. Jewell mentioned a case where not only contraction of the pupil was present upon the same side of the injury, of pressure from a crutch, but there was also flushing of the same side of the face, and the temperature was also elevated upon that side. Another case was alluded to in which there was inflammation of the upper lobe of the right lung, accompanied by a similar phenomenon, and there was also left a marked degree of tenderness over the inferior cervical ganglion, and pressure upon this ganglion produced immediate sweating upon the right side of the face, the pupil contracted, and the patient at once experienced vertigo. These symptoms gradually disappeared.

Dr. Hammond remarked that he had long since come to regard inequalities of the pupil as of no special significance unless accompanied by other symptoms, and referred to a case in which contraction of the pupil was produced by a seton in the neck, and kept up as long as the seton remained.

Dr. Rockwell related the following case in point: A gentleman who had been for several years under my observation for slight symptoms of posterior spinal sclerosis, slipped, one evening, on the ice, and fell in such a way that his right arm

was violently thrown from his side. All that night he suffered from constant vertigo while awake, whether in a horizontal or an erect position. In the morning, when I saw the patient, I found the right pupil firmly contracted, and it remained so for several days. Recovered in a week or ten days.

NERVE INJURY—CUTANEOUS ERUPTION.

Dr. Van Bibber reported a somewhat remarkable case in which a needle had been thrust into the arm of a woman, where it remained two months, and then was extracted without giving any special amount of pain. The next day a crop of bullæ appeared upon the arm, which was followed by successive crops of like character, accompanied with great pain, and the pain preceded the appearance of the eruption. These eruptions continued until the arm, from the insertion of the deltoid down to the wrist, became one continuous sore. When the bullæ broke, or were opened, they left behind open ulcers that showed no tendency to heal, and were more or less covered with hæmorrhagic spots. There was anæsthesia over the entire region of the median nerve, and marked paralysis associated with lesions affecting the wrist and elbow joints.

Under the use of the constant current, the bullæ at once began to disappear, and showed no tendency to return, and within three weeks the arm was free from the eruption. When the pain recurs the galvanic current stops it at once. Since the improvement, scattered bullæ have appeared upon the face and about the head.

Dr. Jewell cited a case of zoster, occurring in a woman weighing about 300 pounds. She was seized with great pains in the region of the uterus, which extended into the inguinal region, and so into the back. These pains were soon followed by chills and burning pains in the skin, following the course of the crural nerve, and finally red lines appeared over the tract of the irritable and painful nerves, which were followed by a herpetic eruption, and the blisters were always preceded by the pain, and they extended from the hips downward. The irritation continued until the trouble of the uterus began to get well. There was a clear connection between the severe congestive disorder of the uterus and pelvic

irritation, on the one hand, and the cutaneous eruption on the other.

Dr. Webber inquired whether there was any pelvic cellulitis.

Dr. Jewell replied that there was none, and that the trouble was probably reflex.

Dr. Hay referred to the case of a gentleman who had been in the habit of wearing his pantaloons without suspenders, and after a while became afflicted with pains which extended down into the hip and testicle. The pain recurred daily, and was always relieved by change to the horizontal position, and would immediately disappear when he went to bed. The man did not obtain any relief by treatment, and his case came to be regarded as one of incurable neuralgia of the testicle. About three years ago a herpetic patch made its appearance upon the inside of the thigh, upon the same side, which became worse during the day, and reached its maximum at night, and was almost entirely well again in the morning. This condition of affairs continued, and one day, while examining his patient, he suggested to him to wear a pair of suspenders. He at once put a pair on, and within forty-eight hours his pain entirely disappeared, and with it the herpetic patch. It was regarded as a clear case of reflex neurosis.

Dr. Miles referred to his own thigh, which was once corded sufficiently tight to produce anæsthesia for some time. He afterwards contracted chills and fever, but the leg below the spot where the cord was placed never got chilly.

Dr. Jewell remarked that there were two important points in these cases with regard to pathology: If the nerve has been injured, the question arises, how is the trouble produced in the skin? Is it by the production of neuritis, which is transmitted along the course of the nerve, or is it by irritative influence, without respect to neuritis, that is transmitted along the nerve in such a manner as to irritate beyond the normal degree, nutritive action in the part? In many cases the explanation must be by the last method.

The next paper was read by Dr. Rockwell, of New York, entitled, "A Survey of the Field of Electro-Medicine, with special reference to its Physiological and Therapeutical Relations to the Nervous System."

MISCELLANEOUS BUSINESS.

Dr. Hammond nominated for membership Drs. S. Oakley Vanderpoel, T. Edwards Clarke, and Clinton Wagner, of New York.

Dr. Mason nominated Drs. J. P. Gray, of Utica, and D. H. Kitchen, of New York.

Dr. E. C. Seguin nominated Dr. G. M. Beard, of New York.

The Association then adjourned, to meet at 2 P. M., June 4th.

THIRD MEETING, June 4th.

The Association was called to order by Vice-President Dr. Jewell at 2:40 P. M.

Present: Drs. Jewell, Hammond, Clymer, Putnam, Cross, Lente, Mason, Kinnicutt, Rockwell, Hamilton, Webber, Lincoln, Hun, Van Bibber, Emerson, McBride, Miles, Hay, and Seguin.

Dr. Hammond asked leave to withdraw his nominations of the day before, which was granted. He then offered the following resolutions:

"*Resolved*, That inasmuch as the number of members of the American Neurological Association is, by the Constitution, limited to fifty, it is inexpedient at this time to elect Superintendents of Insane Asylums to membership.

"*Resolved*, That, in taking this action, the Association does not mean to be understood as depreciating the labors of these gentlemen, and that it is further influenced by the fact that there is already an association composed exclusively of superintendents of lunatic asylums."

This motion, seconded by Dr. Lincoln, gave rise to considerable discussion. A motion to act upon the resolution at once, made by Dr. Mason, was negatived, and, on motion of Dr. Hammond, it (the original resolution) was ordered to lie on the table, and was farther referred to the Council of the Association for report at the next meeting.

The first regular business was proceeded with; the reading of a paper by Dr. Putnam, entitled

ANALYSIS OF A CASE OF CIRCUMSCRIBED ANALGESIA OF THE SKIN AFTER TYPHOID FEVER.

Dr. Putnam based his remarks upon a case of typhoid fever occurring in a male patient eighteen years of age. A short time after his *apparent recovery*, he noticed that slight wounds of the left hand healed only very slowly, and that certain injuries to the hand and arm gave rise to no pain. When examined, it was found that the skin upon the left arm, shoulder, left side of the trunk and neck, up to the median line of the body, and downward to the eighth rib, was in a condition of anæsthesia. The hand could be thrust into water of a temperature of 110° F. without inconvenience, and a pin thrust into the skin failed to cause pain. A light touch, as with a brush, on the tips of the fingers, was almost invariably recognized. When the skin was sprinkled with water, each drop could be distinctly felt. His hand could be retained in water at 120° F. about two minutes, and in water at 160° from two to ten seconds.

At present the left side of the neck has recovered to quite an extent. The case was regarded as one of partial paralysis of sensation, the immediate consequence of the acute attack of typhoid fever, and was probably of peripheral origin. It was thought to be peripheral chiefly because of its definite localization. He did not, however, wish to throw out of the question the cerebral element in studying the case.

Dr. Seguin expressed the opinion that the cerebral element should be left in the problem, and from our present knowledge of hemiplegic analgesia, such as is manifested in hysterical women, hypnotism, and certain conditions produced while inhaling anæsthetics, he inclined to the opinion that the real cause of the conditions noticed in Dr. Putnam's case was due to some encephalic trouble.

NEW DYNAMOMETER.

Dr. A. McLane Hamilton, of New York, exhibited a new dynamometer, in which a rubber bulb is substituted for the spring in the instrument in common use. The instrument consists simply of a rubber bulb containing a colored fluid, which is attached to a glass tube having an index. The prin-

ciple is, that it requires a certain amount of pressure to condense the air in the tube above the fluid, which is marked upon the index.

FRACTURE OF THE ODONTOID PROCESS.

Dr. Hun, Jr., of Albany, presented a specimen removed from a woman aged fifty years, accompanied with a history of previous injury, which caused her to lie insensible for several hours, after which she awoke and walked some distance, ascended a flight of stairs, etc. There were no convulsions or tremors, but there was almost complete anæsthesia of the legs. She rode to the Alms House, walked from the wagon to the house, walked up stairs, and seemed to have no inconvenience in so doing. She remained in the Alms House a few days and died. At post-mortem, the odontoid process was found to be fractured without rupture of the transverse ligament, the atlas dislocated from the axis, and the condyles upon the left side fractured in three places. The patient was not at any time completely paralyzed.

NEURALGIA AND OTHER NEUROSES ARISING FROM CICATRICES OF THE SCALP, AND THEIR SURGICAL TREATMENT.

Dr. Lente, of Cold Spring, N. Y., read a paper upon the above subject, in which he referred to several remarkable cases of neuralgia, amaurosis, and other visual disturbances, which had been completely and rapidly cured by the excision of old cicatrices upon the scalp. He argued that more should be done than simply to incise the cicatrix, and that it should be removed.

An Executive Session was voted at this time, and Dr. Clymer informed the Association, that a letter had been received from Dr. Mitchell, of Philadelphia, stating his inability to attend the meeting, and requesting that his name be withdrawn from the list of officers. Dr. Clymer, therefore, offered the following resolution:

"WHEREAS, The office of President of this Association for the year 1875–6 being vacant by the declination of Dr. S. Weir Mitchell,

"*Resolved*, Unanimously, that Dr. J. S. Jewell is hereby declared President of the Association for the current year,

1875–6, the same as if originally elected as such by the Association, on the report of the Committee on Nominations."

This was unanimously adopted.

On motion, the Council was authorized to fill the vacancy made in the position of Vice-President. The Council immediately made the following nominations:

Dr. Clarke to be 1st Vice-President; Dr. Miles to be 2d Vice-President.

The Council reported, that Dr. Geo. M. Beard had complied with the required conditions, and recommended him for membership. An election by ballot, resulted in Dr. Beard's election. The President, Dr. Jewell, declared Dr. Beard a member of the Association.

The order of business being resumed, the following essay was read:

PIGMENTARY DEPOSITS IN THE BRAIN AS THE RESULT OF MALARIAL POISONING.

Dr. Hammond, of New York, presented a paper upon the above subject, in which he gave the results of clinical observation and experiments upon animals. He regarded the pigment in these cases as being of *splenic* origin. He was of the opinion that, especially in malarious districts, many nervous disorders were induced by the deposit of this pigment in the brain.

Dr. Miles, of Baltimore, spoke of the effect upon the nervous system noticed as the result of malarial poisoning, and cited one case where the chill was represented by an epileptic paroxysm which was followed by the fever and sweating in their regular order.

HEMIPLEGIA WITH CLOT UPON THE SAME SIDE OF THE BRAIN.

Dr. Hay, of Chicago, presented an interesting specimen of this kind, removed from a female patient aged fifty-five years, in whom there was hemiplegia of the left side, face not involved, and the tongue could be protruded without deflection. The patient jumped from a railroad train which was moving at a rapid rate, and was picked up insensible, in which condition she remained for about three weeks. She suffered

from incontinence of urine and fæces. At post-mortem, a meningeal clot was found over the frontal convolution, upon the left side of the brain, about a line in thickness, three-fourths of an inch in length, and about the same in width. No morbid conditions were found in any other part of the brain, and the clot was limited to this region.

Dr. Hamilton remarked that he had produced convulsions in animals upon the same side of the body with the irritation produced in the brain.

The time allotted for the Session having nearly expired, it was moved that the following unread papers be referred to the Council, sitting as a Committee on Publication:

A Note upon the Clinical Effects of Conium, by Dr. William Pepper, of Philadelphia.

The Structure and Functions of the Ganglia on the Posterior Roots of the Spinal Nerves; A Case of Insanity caused by Wound of the Brachial Plexus of Nerves; A Case of Diabetes Insipidus caused by Disease of the Meatus Auditorius Externus; — all by Dr. J. S. Jewell, of Chicago.

Contributions to the Study of Basal Meningitis, by Dr. T. A. McBride, of New York.

Insanity in Children, following Masturbation, by Dr. Frank K. Kinnicutt, of New York.

Tables Showing the Results of the Use of Phosphorus in Neuralgia and other Painful Affections, by Dr. N. B. Emerson, of New York.

On the Structure of the Nervous System, by Dr. H. D. Schmidt, of New Orleans.

On motion, the following gentlemen were appointed by the President, to constitute with the Council, a Committee on Arrangements for the ensuing yearly Session: Drs. Clymer, Hammond, Hamilton.

After passing a vote of thanks to the officers of the Association, and to the Committee on Organization, the Association adjourned to meet in New York, on the first Wednesday in June, 1876.

NOTE.—The Secretary desires to express his indebtedness to Dr. —— Carpenter, of the staff of the *New York Medical Record*, for a stenographic report of the remarks of members, during discussion upon papers.

Reviews and Bibliographical Notices.

I.—THE SYMPATHETIC NERVOUS SYSTEM.

I. Lecons sur l'Appareil Vaso-Moteur. (Physiologie et Pathologie.) Faites a la Faculté de Médicine de Paris. Par A. Vulpian, etc., etc. Redigées et Publiées par le Dr. H. C. Carville, etc. Tome Premier. Paris: 1875, p. 571. (*Lectures on the vaso-motor apparatus, etc.*)

II. Lecons sur les Nerfs Vaso-Moteurs, sur l'Epilepsie, et sur les actions Reflexes Normales et Morbides. Par le Dr. Brown-Séquard. Traduites de l'Anglais par le Dr. Beni-Barde. Paris: 1872, p. 211. (*Lectures on the vaso-motor nerves, etc.*)

III. Des Nerfs Vaso-Moteurs. These pour le Concours d'agregation (Anatomie et Physiologie), par le Dr. Charles Legros. Paris: 1873, p. 111. (*The vaso-motor nerves.*)

IV. Lezioni di Fisiologia Sperimentale sul Sistema Nervoso Encefalico. Date. Dal. Prof. Maurizio Schiff. Nel R. Museo de Firenze, l'Anno, 1864–65. E. Compilate per cura del Prof. Pietro Marchi. Seconda Edizione, Rivista ed Augmentata. Firenze: 1873, p. 548. (*Lectures on the experimental physiology of the central nervous system, etc.*)

V. Kritische und Experimentelle Untersuchung des Nerveneinfluss auf die Erweiterung und Verengerung der Blutgefæsse. Preisschrift von Gustav Rœver. Rostock: 1869, seite 118, zwei Tafeln. (*Critical and experimental investigation on the influence of the nervous system on the dilatation and contraction of the blood-vessels, etc.*)

VI. Sull' Anatomia Patologia del Gran Simpatico. Pio Foa. (Rivista Clinica de Bologna. Fasc, 7–8–9, 1874.) (*On the pathological anatomy of the great sympathetic, etc.*)

VII. Beitræge zur Histiologie u. Path. Anatomie des Sympathischen Nervensystems. Von Dr. Alexis Lubimoff aus Moskau. *Virchow's Archiv f. Path. Anat. u. Klin. Med.* Band 61. Heft 2, s. 145. (*Treatise on the path. anatomy of the sympathetic nervous system, etc.*)

VIII. ON THE FUNCTIONS OF THE SYMPATHETIC SYSTEM OF NERVES, AS A PHYSIOLOGICAL BASIS FOR A RATIONAL SYSTEM OF THERAPEUTICS. By Edward Meryon, M. D., etc. London: 1872, p. 68.

(*Concluded from page* 256.)*

In the last issue of the JOURNAL, we were discussing the effect of irritation of the depressor nerves of Ludwig and Cyon. We will now complete this statement by saying, that if the pneumogastrics and the splanchnic nerves are both divided, a fall in arterial pressure does not in any notable degree follow irritation of the depressor nerves. This sort of experiment shows that the region in which the dilatation of the vessels occurs, that is the chief cause of the fall in blood-pressure, is within the abdomen—or in that vascular domain supplied by the splanchnics. It shows moreover, that the latter contain vaso-dilator fibres, which in a reflex way, may lead to very great congestion, or accumulation of blood within the vessels of the abdomen, thus withdrawing a large quantity from the circulating mass, and in this way, in part, giving rise to the general fall in blood-pressure observed. Direct irritation of the splanchnic nerves leads to contraction of the abdominal vessels, and hence to a temporary increase in blood-pressure, as was observed by Hensen and Bezold. They contain, therefore, vaso-constrictor fibres.

In a subsequent lecture, the results of experimentation on the intra-abdominal circulation, through the channel of the splanchnic nerves, is made much use of in the discussion of "nervous diarrhœa." But as we hope soon to present a complete article on this subject, we will omit a reference to it for the present.

The interesting, though well-known fact is noticed, that excitation of most sensitive nerves, leads to contraction of the vessels and to an increase of blood-pressure, which varies according to the degree of the irritation, or of sensitiveness of the nerve operated on, with the provision, that some few vessels seem to be exceptions to this statement. The central artery of the external ear of the rabbit, dilates instead of contracting, when a sensitive nerve is irritated. To what is this due? It is probably owing to a simple general increase in blood-pressure, which is due to a contraction of the small muscular vessels of most parts of the body, while the muscular wall of the artery of the ear in question is not affected at all, or only in slight degree, as other arteries on the contrary are known to be; and hence, instead of resisting, it yields to the increased expansive pressure.

In the next place, M. Vulpian enters on a full consideration of the relations of the heart to the vessels, and *vice versa*, through the agency of the nervous system. But since it is our intention

---

* In the latter part of that portion of this review, that was contained in the April number of the JOURNAL, an inexcusable blunder was made in saying that irritation of the depressor nerves was followed by an increase of blood-pressure, when the contrary is true.

at no distant day, to give some space to a consideration of this subject, we will pass it by for the present.

The influence of the vaso-motors on blood-pressure, is considered next in order. If the sympathetic is divided in the neck, the corresponding side of the head becomes congested, as is well known. Besides, the manometer shows somewhat surprisingly, that in the congested vessels there is a rise in blood-pressure, that is not observed at the same time in other vessels of the body. Now in view of the laws of fluid pressure, how can this comparatively enduring local increase of pressure be explained? An instantaneous change in pressure could be explained easily enough, but how can a change in this respect, which endures, be produced, without an equilibrium being speedily restored through the medium of collateral and anastomosing vessels—just as happens to fluids in any other system of tubes? There must be some purely local cause for the purely local increase of tension. What can it be? M. Vulpian says: "It is necessary to take into account the much greater afflux of blood which takes place into the arteries of the affected part. And this afflux of blood augments the pressure, in spite of the dilatation of the arterioles." (P. 380.) But this is really no explanation of the case. To say that the pressure is due to the increased afflux of blood into the part in question, is true, but evades the point of the inquiry, which is this: "*What causes the afflux of blood?*" We may say it is a simple consequence of the dilatation of the vessels, which follows division of the sympathetic. This may be, and probably is true. But it does not account for the increased pressure, which, as M. Vulpian himself admits, should be, on theoretical grounds, diminished rather than increased. How can a simple enlargement of the vessels increase the blood-pressure in them? But if this so-called explanation is not the true one, what one is? We insist on this point, because it contains the elements of a very important physiological problem. If it is really a fact, that a local increase in blood-pressure may occur, it may be due to one or both of two causes: either it may depend on an increased attraction between the blood and tissues of the part, or on some peculiar action of the vessels in the part in which there is an increased blood-tension. But to which of these causes, if either? We will only suggest, and not endeavor to answer this inquiry, for we lack both time and space.

An important conclusion in relation to the action of the sympathetic ganglia, and in respect to the location in general of vaso-motor centres, is drawn by M. Vulpian. Says he: "It results from our preceding studies, that the vaso-motor nerves do not have one single reflex centre alone, as there has been an inclination to suppose. If the reflex actions involving the whole vaso-motor system are accomplished through the medulla oblongata, those which take place in limited parts of the body, are produced by the intermediation of distinct cerebro-spinal centres of origin of the vaso-motor nerves, or even for certain of these reflex

actions, by the putting in play of *the reflex activity of the sympathetic nervous ganglions.*" (P. 381.) This conclusion we believe to be, not only justifiable, but necessary.

After having established that alterations in the circulation in small districts of the body, may occur through the agency of the vaso-motor nerves, M. Vulpian next proceeds to show what effects these circulatory alterations exert on the functions of such parts of the body as become the seat of them. First of all on *absorption*. But in an elaborate review of the evidence bearing on this subject, from Schiff, Bernard, Goltz, Prevost, Bernstein, Heubel and himself, in which it appears these different observers have, by no means, attained harmonious results, the conclusion seems to be, that the *vaso-motor* nervous system has an indirect influence on absorption, which depends on the state of the vessels, as regards tonus or tension. If there is more tension, absorption is diminished in a very natural manner, and *vice versa*.

In the next place, the action of the erectile tissues is discussed, and upon the whole, M. Vulpian inclines to look on the mechanism as essentially the same as that by which changes of the ordinary circulation are effected, differing, therefore, from them not in kind, but in degree. The *nervi erigentes* of Eckhard, therefore, may be regarded as *vaso-dilators*, distributed to vessels, endowed with extraordinary expansibility, owing to their structure.

An elaborate discussion is had in respect to the iris, and the influence on the state of the pupil exerted by the vessels of the iris. He cites the researches and opinions of Rouget, who regarded the iris as being provided with erectile tissue, upon the state of which the size of the pupil depended, at least in part. If the erectile tissue was turgid with blood, the pupil was contracted, according to him. If it was ischæmic, the pupil was dilated. He also mentions the views of Th. Leber, who differed from Rouget in ascribing the action of the erectile tissue to the arteries, rather than to the veins, as Rouget had done. But M. Vulpian presents many conclusive arguments, drawn from many sources, which show the above views to be erroneous, and that alterations in the size of the pupil are dependent on the proper muscular tissue of the iris. A short reference to the structure and phenomena presented by erectile tumors, closes the instructive study of this class of tissues.

The next topic for consideration is that of the action of the vaso-motor nerves on the glandular structures — or in others words, the secretions. The salivary glands are first mentioned because of the facilities they offer to the experimental physiologist. The study of the nervous apparatus of the submaxillary gland, is very full and instructive. It establishes the fact of secretory nerves and of both vaso-dilators and vaso-constrictors. Either may be excited in a reflex way. Thus, irritation of any sensory nerve, such as the sciatic, or even of the splanchnics, will increase

at one and the same time the flow of saliva and the quantity of blood. M. Vulpian pretty fully canvasses the facts on which secretory nerves are predicated, and clearly adopts the opinion which admits their existence. The activity of a gland does not depend, therefore, solely on its supply of blood, but on a direct excitation of its secreting cells, by the secretory nerves. These facts, while they have ceased to be novel, have a significance which but few seem to appreciate, and hence we but perform a duty in calling attention to them. The same views that our author has been led to adopt in relation to the nervous supply of the submaxillary gland, he would apply to the other salivary glands, and perhaps to all glands, and not on the grounds of analogy alone. But we cannot now go into a consideration of the important practical relations growing out of this part of our subject, but heartily commend them to our readers.

M. Vulpian passes next to a review of the vaso-motor nerves of the stomach — a most important subject. This organ is supplied with nerves in extraordinary profusion, and from many different sources. A very important question is as to their exact anatomical source. M. Vulpian takes occasion to speak at length in relation to the very complex composition of the vagus nerve, especially during its intra-thoracic course. He does this upon the ground of his own proper researches, which are published for the first time in these lectures. The œsophageal portion of the vagus, from the neck downward, acquires new fibres at many points, especially from the sympathetic, so that before arriving at the stomach not more than a fourth or a fifth of its fibres are composed by cerebro-spinal fibres, which belong to the nerve at its exit from the cranium. But alluding to other sources of nervous supply, and after recounting the results of various experiments, such as those of Schiff (*Lecons sur la Phys. de la Digestion*, vol. I. and II.), and his own, he announces himself as without any positive experimental data bearing on the remote vaso-motor supply of the stomach. He is inclined to think that the observed changes in the circulation in the mucous membrane of the stomach, are mainly effected through the rich plexuses of ganglion cells (*plexuses of Meissner and of Auerbach*) which exist in the coats of the stomach. But in this connection M. Vulpian places himself at the pathological stand-point, and recounts the congestions and ecchymoses of the mucous membrane of the stomach, that some have observed to follow lesions of the crura cerebri or optic thalami, whether experimental or pathological. After discussing the various possible modes by which lesions of the parts named might produce the congestions and ecchymoses observed to follow them, as described, he declares provisionally in favor of the view which affirms constriction of the muscular arteries, so as to interrupt the course of the blood for a time in the ecchymosed parts. We will not enter on an analysis of this case, but must say the explanation M. Vulpian seems inclined to adopt is to us highly improbable.

The opinion of Virchow, long since emitted, seems far more probable, viz.: that the condition referred to of the mucous membrane of the stomach, owes its existence to embolism of the small gastric vessels, with consequent softening of the related membrane, produced in part by its digestion in its own gastric juice. These views are supported by the experimental observations of Panum and others. But by what channels do lesions of the optic thalami, etc., produce the observed effects in the mucous membrane of the stomach, if we adopt either view presented of their pathogenesis? Schiff has examined this question more carefully perhaps than any other observer, and concludes that the influence which proceeds from the injured parts of the brain descends in the anterior columns and gray mattter of the cord, and lower down through the splanchnic nerves and those of the solar plexus. But it is impossible to decide whether these results should be accepted or not, until the experiments on which they are based shall have been repeated by other competent physiologists, for we have regretted to notice a certain lack of critical judgment in the work of this most experienced and talented physiologist (Schiff). If the views of Virchow are to be adopted in this case, where and by what means are the emboli or thromboses produced that obstruct the vessels, which obstructions lead to the hæmorrhagic infarctions observed? No answer to this question seems to have been even thought of by M. Vulpian. In fact, the question as to the relation between cerebral lesions and ecchymoses and ulcerations in the mucous membrane of the stomach, remains at least partly unanswered.

The next subject is that of the "influence of the vaso-motors on the intestines." But, as already said, we expect soon to consider the subject of "nervous diarrhœa" in a special article, when the nervous supply of the intestines will receive careful attention.

In speaking of the "influence of the vaso-motors on the urinary secretion," the remark is made that as much as the secretion of the urine may depend on the action of the secreting structure of the kidneys, that it also depends in some measure on the degree of "pressure of the blood in the numerous capillaries of the kidneys."

But without disputing the fact of augmented pressure, we submit that the action of the vaso-motor nerves of an organ is not sufficient to explain increased pressure, especially if, as in this case, it coincides with *dilatation* of the vessels. As already said above, how can simple enlargement of a vessel account for increased pressure of its contained fluid? If there is a simultaneous contraction of the vessels of other parts of the body, the phenomenon in question may be explained, or if there is an increased attraction between the blood and tissue of the kidney, but not on the supposition of a simple dilatation.

And this point does not seem to have sufficiently occupied the attention of Prof. Vulpian. The vaso-motors may, by their

action on the vessels, increase or diminish the supply of blood within the kidney in a given time, but nothing more.

But this does not comprise all the elements of our problem. It omits, or incorrectly includes, the action of the secretory nerves of the kidneys.

Now, what is known as to the influence of the nervous system on the action of the kidneys?

M. Vulpian enumerates, somewhat critically, various kinds of medicinal agents that are known to act on the kidneys, and is inclined to explain their action by admitting that they enter the blood, and, coming into contact with the secreting structure of the kidneys, excite it, and the secreting structure, in this state of excitement, involves the intrinsic vaso-motor nervous apparatus of the organ in such way as to lead to dilatation of the vessels, and hence to an increased blood supply. In this class alcohol is ranged, for example.

If the great splanchnic nerve on one side is divided, congestion of the corresponding kidney follows immediately. If the peripheral end of the divided nerve is irritated by the induced current, the kidney in a short time will become very noticeably pale. Hence, the splanchnics contain vaso-motor fibres of the vessels of the kidney, especially vaso-constrictors.

Moreover, when the splanchnic has been divided, besides the consequent congestion, there is also an increase in the amount of urine voided, which is also, at least occasionally, albuminous. But a microscopical examination does not show blood globules, nor hyaline cylinders, nor epithelium from the uriniferous tubes. Neither operations conducted on the pneumogastric, nor the sciatic appeared to have an appreciable influence in modifying the action of the kidneys.

M. Vulpian would make the splanchnics part of the nervous mechanism through which the secretion of the urine is arrested in "nephritic colic," or pain along the course of the ureter, induced especially by the passage of a renal calculus.

But by what route do vaso-dilator fibres arrive at the kidneys? Though it has not been satisfactorily demonstrated, yet our author believes they pass by the splanchnics, but regards them to be far less in number than the vaso-constrictors. He rejects, on what appear to be adequate grounds, the earlier opinion of Bernard, that they are contained, partly at least, in the pneumogastrics above the diaphragm. Reference is then made to the influence of the sympathetic on the circulation of the kidneys, and, as might have been foreseen, it has been found that operations conducted on that portion of the sympathetic from which the splanchnic nerves arise, lead to similar results to those following experiments on the splanchnics themselves.

But what parts of the cerebro-spinal axis, if any, exert an influence on the circulation in the kidneys? As might have been expected, the original and beautiful experiments of Bernard, in reference to the influence of slight wounds in the floor of the

fourth ventricle on the action of the kidneys, are described. As every one knows, such lesions were followed by diabetes. M. Vulpian believes, very properly as it seems to us, that the effects of the wounds are two-fold : first, they include an excitation of the vaso-dilator nerves of the kidneys ; and second, an excitation of their secretory nerves.

Not to go into other proofs, positive and negative, in relation to the point in question, it may be provisionally announced that the cerebro-spinal centre for the control of the action of the kidneys is in the floor of the fourth ventricle. Pathological proofs of this position are offered from MM. Lancereaux (*Thesè d' Aggregation*), Hayem, and from the author's personal observations in a case referred to him by M. Liouville.

And the disease of the medulla, capable of producing diabetes, may be idiopathic or secondary, as we have had occasion to show in a case reported elsewhere. As regards the appearance of albumen in the urine, it should be observed that it follows experimental lesions of different parts of the brain (peduncles, Schiff; and of many parts of the brain and cord, and even section of the trigeminus, Longet, Vulpian, etc.).

Some space is next given to the various forms of true *anuria*, such as is produced during the passage of urinary calculi, or during experimental excitation of the pelvis of the kidney, or the ureters, or in hysteria. In brief, the mechanism in such cases is believed to be as follows : From the point of painful excitation, an impression is carried along the sensory nerves to the cord, or even higher, and is then reflected out again along the vaso-constrictor nerves of the splanchnics, so as to affect them, or the vessels of the kidneys through them, in the same manner as was observed during their experimental irritation.

The next and final subject of this volume, is that of the action of the vaso-motors on the liver. M. Vulpian enters on an interesting and graphic resumé in respect to the intimate structure of the liver. But our present concern is with the action of the vaso-motor nerves on the remarkably abundant vascular supply of the liver, which receives more blood than any other organ in the body except the lungs. But inasmuch as the discussion relating to the nerves of the liver is chiefly contained in the next volume, we will omit a review of this subject as it appears in the light in which it has been placed by M. Vulpian, until the second volume of this intensely interesting work shall come to hand. It will probably be reviewed in the October number. Until then, we will reserve the expression of any general opinions concerning the value and tendencies of the work.

We reproduce the titles of subjects treated in the second volume, that our readers may become acquainted with its scope:

"The influence of the vaso-motor apparatus on the glycogenic function of the liver—vaso-motor nerves of the spinal cord—role of the vaso-motors, in hydrophobia, hysteria, epilepsy, sleep, etc. —action of the vaso-motors on the intra-muscular circulation—its

influence on animal heat—on fever—influence on intimate nutrition—trophic disorders of the ocular apparatus, produced by division of the fifth nerve within the cavity of the cranium—lesions of the lungs consecutive to division of the pneumogastrics—results of section of the spermatic nerves—role of this apparatus in the alterations of the muscles, consecutive to lesions of the nervous centres—reflex muscular atrophies—influence of the vaso-motors in the production of congestions—role of the sympathetic in hæmorrhages—its influence on the inflammatory process—œdema—on symmetrical gangrene of the extremities—neuroses—migraines—exophthalmic cachexia—influence on this apparatus of poisons and medicinal agents, considered as *vaso-constrictors* and *vaso-dilators*, etc., etc."

From this outline of the contents of the second volume, it can be readily seen that it promises much that is practically interesting. We will not fail, in an early number, to present a pretty full exhibition of the best results arrived at, for the benefit of our readers.

II. The next volume on our list, though recently issued, contains but little that is recent, though much that is scientifically and historically valuable. It consists chiefly of a translation from the English into the French, of certain lectures (IX., X., XI.) contained in the valuable and well-known work of Dr. Brown-Sequard, entitled "*Physiology and Pathology of the Central Nervous System*," and including in an appendix nearly all the subsequent utterances in respect to the vaso-motor nervous system by this distinguished physiologist, most of which have been before the reading medical public, in some form, for years past. For this reason, and because so much space has been given to the more recent and elaborate work of his worthy successor, Prof. Vulpian, we will dismiss it without further notice. But we would not do so without making it the occasion of declaring the high interest we feel in all the deliberate utterances of the justly celebrated author of the work before us.

III. This is one of the most valuable of the smaller contributions to our knowledge of the vaso-motor nervous system, and constitutes the thesis (*d'aggregation*) of Dr. Ch. Legros, whose recent death has been the occasion of such lively regret. The paper (111 pages) is divided into three principal parts, viz., historical, anatomical, and physiological.

The first part briefly traces the history of discovery in relation to the vaso-motor nervous system. But this subject has been so fully noticed in the JOURNAL, as well as all that pertains to the anatomy of this nervous system, as to render any notice of these parts of M. Legros' paper superfluous for our readers.

Under the head of "Physiology," the first things mentioned are the effects of "*destruction* of the vaso-motors." But this term is incorrectly applied. Because to divide the trunk of the sympathetic in the neck, for example, is not the same as to *destroy* the "sympathetic" in the corresponding side of the head. Because

there can be no doubt that the most important part of the apparatus—the peripheral—remains intact after the division, though more or less permanently crippled in its functions.

But though the greater portion of the memoir is devoted to a discussion of the physiology of the vaso-motor nervous system, under various relations, some of them in a degree irrelevant, yet after the review of the work of M. Vulpian, which either has been, or is to be made, it will hardly prove useful to enter upon an extended discussion of the contents of this paper.

There is one point, however, that has been made by M. Legros in respect to rhythmical action of the muscular vessels as an aid in the circulation of the blood, to the consideration of which we would be glad to devote some time. But inasmuch as this same topic was pretty fully discussed in the July number of the last volume, we do not feel obliged to call it up again, though it merits a more careful discussion than we have been able to give it.

The paper closes with a few suggestive remarks on the application of the principles deduced in the preceding parts of the work to the domain of pathology. But we must pass this clear and interesting paper by, with heartily recommending it to our readers who are in search of information on the subject of which it treats. And here, without finishing our list of works, we must close this notice, for the reason that we can afford no more space to it, though notices of three of the other memoirs had been written—especially on the works of Schiff and Meryon. Some mention may be made of them in reviewing the second volume of M. Vulpian.

II.—HARTLEY, ON MAN.

Observations on Man; his frame, his duty, and his expectations. In two parts. Part I., containing observations on the frame of the human body and mind, and on their mutual connexions and influences. Part II., etc., etc., etc. Also a sketch of the life and character, and a head of the author. Quarto, pp. 756. London: 1791.

And why call up the work of Hartley, first published more than a century ago (1749)? *Firstly*, because it contains useful and interesting matter for consideration, even now, by the celebrated founder of the "Hartleian school"; and *secondly*, because we wish to show by the example of Hartley, how much may be done in the cautious use of *inference*, against any but the most restricted use of which, there is such a decided feeling in certain quarters to-day.

David Hartley, born the 30th of August, 1705, was carefully trained, and though destined to a different vocation, was finally, and for his day, thoroughly educated as a physician, and gave much of his life subsequently to the practice of his profession. But being naturally fond of "philosophical" studies, and his education and associations with the learned of his day, conspiring with his tastes, he was led during his life to philosophical pursuits.

A disciple of the school of Locke, he applied himself, in an independent manner, to a study of the system of the latter; and from his knowledge of the structure of the nervous system, was led to see what he esteemed to be the principal defect at that time of the so-called "sensational school," viz.: its neglect of a study of the physiology of the nervous system, as necessary, especially to a just comprehension of the process of sensation, which is of such fundamental importance in the system of Locke, seeing that everything in our intellectual lives, directly or indirectly, depends on or grows out of our sensations. Hence Hartley gave himself to a close study of the nervous system, and to such an extent did he proceed in this direction, as to enable him with justice, to found a psychological school, to which, by common consent, his name has been given, viz.: the "Hartleian."

The famous Dr. Priestly, of whom we have lately heard so much, was one of his most distinguished disciples; and whether they are conscious of it or not, many psychologists and the majority of physiologists of this day, are treading in the path first clearly opened by Dr. Hartley. The service by which he is chiefly remembered is that of bringing physiology to the aid of a study of psychology—or of the mind and its phenomena. But it is not in this aspect that we would now consider his writings. We wish simply to notice his views as to the structure and modes of action of the nervous system, for the purposes we have just announced, and we feel that our readers will not think their time wasted when they have followed us to the end.

In considering the statements of Hartley, we must remember, that one hundred and twenty-six years have passed since the first issue of his work, which would place the beginning of his studies almost one century and a half prior to our own time. Those who are acquainted with the history of the progress of the anatomy and physiology of the nervous system, will remember, that this was before almost all the really fruitful discoveries pertaining to the subjects in hand. It was prior to the appearance of the works of Unzer, Prochaska, Bell, Magendie and Hall, not to mention those of a host of later observers. It is but just to say that the anatomy and physiology of the nervous system at the time when Dr. Hartley must have formed his opinions, were of the crudest description, in all except what pertained to the outer form, and grosser divisions which it presents. But Dr. Hartley's views relate chiefly, as will be seen, to the inner structure and more recondite actions of the nervous system, which subjects at that time were only open to the incursions of inference.

With these preliminary remarks, we will pass at once to ascertain what his views actually were, under the above head.

Before proceeding to fulfill the more immediate part of our design, we will state briefly the outlines of Hartley's theory, that the relation of his deductions to it may be made more easily apparent. Hartley was an admiring disciple of Sir Isaac Newton, whom he had known at Cambridge, where Hartley was educated. He was twenty-two years of age at the time of Newton's death, which occurred in 1727. From him he adopted a theory of *vibrations*, by which he sought to explain, among other things, certain nervous and mental phenomena, as will be seen more plainly hereafter.

To say nothing at present of the doctrine of *association* which he borrowed from Locke, it is farther to be observed, that he adopted from Newton the hypothesis of a subtle ether, as the necessary medium of his vibrations, which *ether* was supposed to be capable of penetrating freely between the pores of grosser matter, and thus to become the medium of conveying those vibratory motions; which, when they are propagated to our bodies under suitable circumstances, produce in them the sensations of heat, light, etc., not to mention other sensations or states. Admitting the existence of vibrations as a mere hypothesis, and the existence of the delicate and responsive medium that was and is yet called *ether*, or the "ethereal medium," and admitting that the phenomena of muscular motion and sensation, as accomplished in animals, might be explained by the use of his hypothesis of vibrations, it was one of the peculiar tasks of Hartley to deduce the structure and explain the modes of action or actual phenomena of the nervous system, both of which were essentially unknown in his day. And we think it instructive to note, how much this celebrated man was able to deduce correctly, in the way of a wise use of his hypothesis, and of the few facts known to him.

His example, among a few other, serves to show the value of analytical reflection on even a few facts, and of a cautious use of hypothesis. There is a decided disposition in certain quarters today, to decry the results of reflection on facts, when these results go at all beyond the facts, and even the legitimate use of hypothesis, as a return to the follies of the dark ages. And we are led to speak of this spirit with all the more propriety, because it must always be true, so far as can be judged at present, that there will be domains of the nervous system, in a measure inaccessible to experimental research, and into which we must penetrate, if at all, guided by the hand of inference; and this mode of procedure, if the one who employs it is fully aware of its dangers, is a perfectly legitimate one.

But to begin, we will cite a few passages from the first part of the work of Hartley, to show the character of the views to which he was led chiefly by inference, from the stand-point of his theory. Then first, as to the nature of the ultimate nerve-fibres. Says he: "If we admit the foregoing account of the uniform

continuous texture of the medullary substance, it will follow that the nerves are rather solid capillaments * * * than small *tubuli*, according to Boerhaave. And the same doctrine *arises from admitting the conclusion of vibrations.* The vibrations hereafter to be described, may more easily be conceived to be propagated along *solid capillaments so uniform in their texture as to be pellucid when singly taken*, than along hollow *tubuli*" (Prop. V., page 8). We might quote other statements of the same character, and which would all agree with the one made. What we wish to call the attention of the reader to is, the tolerable completeness with which this suppositious description of a nerve-fibre has been confirmed by subsequent microscopical research. Hartley has pretty fully described the axis cylinder of the ultimate nerve-fibre, which was not discovered until about one hundred years later, by Remak of Berlin (1838.)

Let us next see what was Hartley's opinion, say as to the mode of affecting the sensory nerves, and the mode of propagation of impressions along the same, etc. Says he: "We are to conceive that when external objects are impressed on the sensory nerves, they excite vibrations in the ether residing in the pores of these nerves, by means of the mutual actions interceding between the objects, nerves, and ether. For there seem to be mutual actions of all the varieties between these three in all the senses, though of a different nature in different senses. Thus, it seems, light affects both the optic nerve and the ether, and also that the affections of the ether are communicated to the optic nerve, and *vice versa*, and the same may be observed of frictions of the skin, tastes, smells, and sounds, etc. * * * We are to conceive that the vibrations thus excited in the ether, will agitate the small particles of the medullary substance of the sensory nerves with synchronous vibrations, in the same manner as the vibrations of the air in sounds agitate many regular bodies with corresponding vibrations or tremblings, etc. * * * One may conjecture, indeed, that the rays of light excite vibrations in the small particles of the optic nerve, by a direct and immediate action. For it seems probable * * * that the rays of light are *themselves agitated by very subtle vibrations*, and consequently that they must communicate these directly and immediately to the particles of the optic nerves. * * * The vibrations thus excited in the ether and particles of the sensory nerves, will be propagated along the course of these nerves up to the brain. * * * This free propagation of vibrations along the course of the nerves, may be illustrated and confirmed by the like free propagation of sounds along the surface of water, which has sometimes been observed in still, calm nights. The vibrations here described are confined to the medullary substance. * * * As soon as the vibrations enter the brain, they begin to be propagated freely every way over the medullary substance, * * * or, if we suppose the *pia mater* to make some small discontinuity in the medullary substance by its processes, as has been hinted above, then we

must also suppose that the vibrations which ascend along any sensory nerve will affect the region of the brain more, and other regions less, than according to this proportion. Since the vibrations or reciprocal motions of the small particles of each nerve are made in the same line of direction with the nerve, they must enter the brain in that direction at considerable distances within the brain, especially if this be favored by the structure of the nervous fibrils in the brain. Hence the same parts of the brain may be made to vibrate in different directions, according to the different directions of the nerves by which the vibrations enter." (Prop. V., p. 10–12.)

What more probable account could be given, even at this day, than the one we have just quoted from Hartley, as to the mode by which external agents affect the sensory nervous apparatus, and by which the impressions produced are conveyed to the brain, or one that is more agreeable to what is known as to the constitution of the nerve-fibre? And, it must be remembered, these statements were made as pure inferences drawn from the consideration of a few gross facts, and from his hypothesis of an ether and vibrations. There are just two modes by which we may conceive of impressions being carried along nerve-fibres. One way is to suppose the circulation of a nervous force, the other is the passage of vibrations, as Hartley has supposed, and others. Not to quote the opinions of older physiologists on this point, let us hear what is the opinion on this subject of one of the most accomplished of living physiologists to-day — Prof. Vulpian. He says in respect to the hypothesis of the circulation of a nervous force: "You know that this hypothesis, emitted a long time since by certain eminent physiologists — among others Carus — has its partisans to-day, though refuted long since by J. Mueller. It is supposed that a peculiar fluid, emanating from the nervous centres, traverses the anterior roots, and is conveyed toward the periphery by the motor nerve-fibres, where it is supposed there are nervous loops, which put into communication the motor and sensory nerve-fibres, and that in this way the nervous fluid passes into the sensory nerve-fibres, returning thus toward the nervous centres, to recommence its course through the motor fibres towards the periphery. * * * It is necessary in this case to have, first of all, a nervous fluid. But is there such a fluid? Then it is necessary that this fluid should be in incessant movement, for without this there is no true circulation. What peremptory proof can we give of the existence of such a movement? Finally, it is necessary to have a direct communication between the terminal extremities of the motor and sensory nerves, which is demonstrably inexact. How bizarre is the human mind! Does the hypothesis of the circulation of a nervous fluid throw any light on the physiology of the nervous system? Most assuredly not. We may say to the contrary, that if we ever come to demonstrate the reality of a nervous circulation, such as has been admitted, the mechanism of nervous

action will appear still more obscure than it is to-day."* In other words, if either theory is conformable to what is at present known in regard to the nervous system, it is the one so clearly stated by Hartley, and not as a mere guess, but as a legitimate deduction from reasonable premises.

Hartley's theory of vision is worthy of remark, in respect to what is said as to the nature of light. The theory of his master (Newton), is well known; but the theory of Hartley was a very different one—the one, in fact, that is adopted to-day—the vibratory.

Having got the sensory vibrations into the nervous centres, let us see in what manner he disposes of them. Says he: "It is reasonable also to think, that the nerves of different parts have innumerable communications with each other in the brain, ganglions (which are, as it were, little brains, according to the opinion of Winslow), and even in the plexuses, and that many phenomena, particularly those of a sympathetic kind, are deducible from these communications" (Prop. V., p. 9).

Again: "The subtle motions excited in the sensory nerves, and medullary substance of the brain during sensation and intellectual perception, must, of whatever kind they be, pass into the motory nerves, and when they are arrived there, it is probable they must cause the contraction of the muscles, both because otherwise their arrival at the motory nerves would be superfluous, and because some such subtle motions are required for this purpose" (Prop. XV., p. 48).

Again: "The *same motion that occasions sensation and intellectual perception, passes through the seats of these into the motory nerves, in order to excite there, the automatic and voluntary motions*" (Prop. XV., p. 49).

Again: "We are to conceive that those sensory vibrations which are excited in the external organs and ascend towards the brain, when they arrive in their ascent at the origins of the motory nerves * * * detach a part of themselves (the vibrations do) at each of these origins, down the motory nerves, etc." (Prop. XVIII., p. 52).

But not to quote other passages describing the mechanism of what has been since called "reflex nervous action," we will cite a few *examples* of such action from the many referred to by Hartley. Says he, shortly after the last quotation, and under the same proposition: "I shall hereafter produce several examples of this process in detail. It may suffice at present, just to mention the action of sneezing, and to desire the reader to compare this action in a cursory way, with the foregoing account (Prop. XVIII., p. 53).

"The actions of sneezing, swallowing, coughing, hiccoughing, vomiting, and expelling the fæces and urine with others of like

---

* *Leçons sur la Physiologie Générale et Comparée du Systéme Nerveux, etc.*, Par A. Vulpian. Paris, 1866, p. 184.

nature, are to be deduced from the fourth and fifth classes of motory vibrations (all of them reflex); *i. e.*, either from those vibrations which first ascend up the sensory nerves, and then are detached down the motory nerves, which communicate with these by common trunk, plexus, or ganglion, or else from those vibrations that run along the surfaces of uniform membranes, and so affect all the muscles that lie contiguous to these membranes" (Prop. XVIII., p. 55).

"Strong contractions of the limbs are often excited by frictions, gripes, and other vivid sensations. * * * General convulsions, from acidities, and other irritations in the bowels, seem to be excited in the same way," that is, in a reflex way (Prop. XVIII., p. 56).

"Let us suppose then a young child to have a very painful impression made upon the skin, as by a burn. It is plain that the violent vibrations excited in the injured part will pass up to the brain, and over the whole muscular system immediately; putting all the muscles into a state of contraction as much as may be" (Prop. XXXIV., p. 85).

"The whole action of suction with all its circumstances, is excited by the mechanical impressions, mechanically or automatically, and by the running of the vibrations of the sensory nerves into the neighboring motor ones" (Prop. XLV., p. 99).

And finally, we will quote a few passages relating to the more recondite applications, of what we may call his theory of reflex nervous action—applications indeed, which are to be found among the most recent of the advances in nervous physiology:

"As the bowels derive their peristaltic motion, in part, from the second and third classes (of reflex actions previously described), so it seems *that the secretory and the excretory vessels of the glands must be constantly agitated with a like motion from the same causes, performing their ordinary secretions and excretions thereby*" (Prop. XVIII., p. 56).

"If the skin be contracted by any cause different from the direct impression of cold, as by the pain propagated from a wound, the colic, the irritation of a stone in the bladder, etc., this contraction is first excited in the muscular variously interwoven fibrils of the skin, etc. * * * The tremors, *i. e.*, sudden, short, alternate contractions of the antagonist muscles, which happen in the foregoing cases (cold, pain from various causes), arise probably from an increase of vibrations, not subject to ideas, and the voluntary power; descending from the brain into the whole system of muscles, and seem to differ from the stronger, larger convulsive motions of hysteric and epileptic disorders, called convulsions emphatically, rather in degree than in kind. These tremors generally precede the sense of chilliness, when the contraction of the fibrils of the skin does not arise from the direct impression of cold. We may from hence, pass to the sensation of chilliness, and the tremors which are sometimes occasioned by the passions, fear, anger, surprise, joy, etc. Both

the redness and the paleness of the lips, face and neck, observable in these cases, are marks of a contraction in the muscular fibrils; in a less degree in the first case, so as to check the return of the venal blood; in a greater in the last, so as to prevent the influx of the arterial" (Prop. XXIV., p. 69).

Could a better account of nervous reflex action be given to-day, than these extracts contain, or more pertinent examples offered of the same? Is it not a little surprising, to what an extent the views of Hartley were carried, when it is remembered how crude was the knowledge of the nervous system in his day? The last statement quoted, describes with singular foresight, the action of the nervous system on secreting structures—the experimental demonstration of which, it was reserved for Ludwig to make, probably for the first time, more than a hundred years later.

Having considered Hartley's views as to the action of sensory nerves under impressions made on them by outer objects, and their relations in the nervous centres with the origins of the motor nerves, let us for a moment turn attention to his views as to the mode of action of the motor nerves on the muscles.

Says he: "Vibrations descend along the motory nerves; *i. e.*, the nerves which go to the muscles in some such manner as sound runs along the surfaces of rivers, or an electrical virtue along hempen strings. These vibrations, when they arrive at the muscular fibres, are communicated to them, so that the small particles of these fibres shall be agitated with like vibrations. The vibrations thus excited in the fibres, put into action an attractive virtue, perhaps of the electrical kind, which lies concealed in the particles of the muscles. * * * Each muscular fibre, and consequently the whole muscle, is made shorter by this increase of attraction in its particles" (Prop. XVI., p. 50).

This is certainly a remarkably correct account of the phenomena of muscular contraction. There are several other statements concerning the relations of the motor nerves to the muscular fibres, and especially one in which he affirms an older opinion: "that the muscular fibres are mere productions of the ultimate nerves" (Boerhaave) (Prop. V. p. 12); and others touching the relations of the sensory nerves to the brain and motor nerves that are equally curious in their strict anticipations of the results of later scientific research to which we might refer, but the time and space we can afford to this paper will not permit us to do more.

We had hoped to have called attention to the remarkably full and satisfactory discussion of Hartley in respect to the distinction between automatic and voluntary muscular motion —to his account of the dependence of mental action on the brain—his explanation of the reason for the continuance of sense impressions after the removal of the objects causing them—to his remarks on the relations between the white and the gray matter of the nervous system—on the probable structure of the brain—on his explanation of the changes of con-

ductibility of nerve-fibres—the division of the brain into parts or regions corresponding to the various nerves of the body—on his truly admirable remarks as to the physiological aspect of the process of obtaining a knowledge of space relations—on the seats of true sensibility and of mental action—on the duality of the nervous system—on muscular tonus—on heredity, and the relations of body and mind; under all of which heads—not to mention others—there are highly interesting remarks that may well be adopted as expressing in the main, the present state of physiological science as touching the same matters, but we are obliged to pass all of them by with a bare recital of points.

But if we mistake not, we have cited a sufficient number of passages already, to show how much Hartley was in advance of the physiology of his times in respect to the structure and modes of action of the nervous system. By what means did Hartley arrive at so many just views in respect to the difficult subject on which he wrote? Simply by doing what his illustrious master Newton did when he discovered the law of gravitation, by patient reflection, on a fact so simple as the fall of an apple; which fact, common as it was and is, involves really the law, which by generalization was seen to extend its jurisdiction throughout the visible universe. Even so it was with Hartley. Reflecting cautiously and patiently on the few facts that he had accumulated, and aided by an ingenious theory, he was able to declare in fair outline the structure and probable modes of action of important parts of the nervous system, as legitimate deductions from rational premises. If so much could be done by Hartley on the basis of so few ascertained facts, guided by a cautious but free use of inference, what might not be done to-day when such multitudes of facts await, in incoherent masses, the hand of patient critical reflection? We are as well aware as we can be, that we are proclaiming no new truth, nor recommending any new practice, when we declare that the greatest need in the sphere of the natural and physical sciences of to-day is not less experimentation, but more and better balanced thought, or more logical reflective power, and a freer, because a more rational use of *inference.* And we are ready to justify our remarks when we say, that there is a well-marked loss of balance now existing in the general movement of science, in favor of experimentation, as against critical thought on its methods and results. And in no other department of human effort is this state of things more conspicuous, or its results more deplorable, than in that of medicine.

III.—RELATION OF THE NERVOUS SYSTEM TO BODILY TEMPERATURE IN DISEASE.

I.—H. SENATOR. UNTERSUCHUNGEN UEBER DEN FIEBERHAFTEN PROCESS U. SEINE BEHANDLUNG. (*Researches on the febrile process and its treatment.*) Berlin, 1873.

II.—W. WINTERNITZ. UEBER WESEN U. BEHANDLUNG DES FIEBERS. (*The nature and treatment of Fever.*) *Wiener Klinik*, I. Heft, 3, March, 1875.

III.—H. C. WOOD. A STUDY OF THE NATURE AND MECHANISM OF FEVER. *Toner lecture*, No. IV., Jan. 20, 1875.

I. Although Senator's work appeared some time since, we deem it best to incorporate it into this review, as its thorough contents enable it to serve as a basis and criterion of subsequent researches. Commencing with a historical survey, Senator cites in succession the different views concerning the febrile process, viz.: the earlier theory of increased production of caloric—Traube's explanation of diminished loss of heat by spasm of the cutaneous vessels, and on the other hand Leyden's experimental results, according to which, both calorification and the radiation of heat are augmented, while the loss by evaporation is reduced. Hereupon he details his own researches, made on seven dogs, which number is perhaps sufficient for the object sought, though it hardly justifies such an extended record, about fifty pages being filled entirely with figures, the calculations from which the reader is not expected to make, as the author himself introduces them. The excretions of the animals were analyzed, and the loss of heat determined in the normal state, during abstinence and during a fever caused by subcutaneous injection of fresh pus from abscesses which the author prefers to purulent sputa, as the latter proved always fatal. The results varying in absolute numbers in the different cases were the following:

1. The formation and excretion of urea, the index of the destruction of the albuminous tissues, is augmented during the entire duration of fever, when compared with a corresponding period during abstinence, but the diurnal quantity of urea is *much less* than during the time when the animals are well nourished.

2. The loss of CO_2 and water is increased, as compared with the non-febrile state *under the same conditions;* as the conditions for excretion are more favorable.

3. The water is mostly eliminated by the kidneys, hence the preponderance of the sensible over the insensible losses.

4. The insensible losses, especially the exhalation of CO_2 *are*

never augmented during the earlier hours following the injection of pus, while the temperature is still rising; if anything, they are diminished; in the course of the fever, however, they increase slightly.

5. During the period of fever, the excretion of CO_2, and *probably* also of water, shows constant oscillations.

6. It is neither proven nor probable, that an animal in the febrile state loses *at night* more, or even as much CO_2 as during daytime; hence calculations of the diurnal quantity made from observations of the exhalation of CO_2 during some hours of the day, yield probably too large results.

7. Still the diurnal quantity of CO_2 *corresponds in no way* to the increase of urea observed.

8. In fever an accumulation of CO_2 does not occur, the opposite being more probable.

9. The oxidation, therefore, of non-nitrogenous hydro-carbons (fats) into CO_2, does not keep pace with the reduction of albumen into urea; on the contrary, it seems to be diminished.

10. The feverish animal gains on this account in hydro-carbons. This is probably the reason of the fatty degeneration of tissues observed during fevers.

11. The loss of heat is *never increased in the initial stage of fever*, but rather diminished; hence an abnormal accumulation of heat in the system.

12. In the further course of the fever, the loss of heat suffers oscillations like the exhalation of CO_2.

13. *The production* of heat also is subject to similar oscillations, being sometimes greater, sometimes less, than in the corresponding non-febrile state.

14. It cannot yet be decided whether the entire loss of heat exceeds the amount given off by the healthy animal in the same state of nutrition.

15. In the course of the fever, tissue-metamorphosis is constantly diminishing, while the temperature and loss of heat retain their abnormal height. *There is, therefore, in fever, no definite relation between tissue-change and calorification.*

In the course of his very critical discussions on the researches of others on fever *in man*, the author establishes the facts, that since according to Manassein, the red corpuscles are diminished in size during fever, while they enlarge when rich in O, as well as under the influence of antipyretics, the febrile system consumes less O, though it still exhales somewhat *more* CO_2 than during apyrexia, the waste thus overbalancing repair. The formation of urea is increased in an enormously greater proportion, however, than CO_2, as is manifested not only by its augmented excretion during the fever, but also the increase of the same during and after the *crisis*, the result of its previous accumulation. This may be due to a *diminution* during the fever and subsequent critical *increase* of the excretion of water, which had probably also accumulated. A corresponding increase in the excretion of

potassic salts likewise occurs; also a result of augmented waste of albuminous tissues, especially the hematoglobuline of the blood corpuscles.

The increase of calorification may be rated at least at seventy-five per cent., for which we must account in various ways. The initial retention of heat is one source of an increased temperature; but will not account for it alone. The increased formation of urea will also not suffice, and even if we assume the occurrence of various yet unknown syntheses, resulting in a liberation of water and heat, we still lack one factor of the result, which Senator is inclined to look for in the transformation of accumulated *hypothetical* forces of tension otherwise employed in the production of muscular force, which accounts for the fatigue and exhaustion following fever. The question now arises why the increased production of heat is not compensated for in fever by a correspondingly increased loss. Liebermeister's theory, that in fever the regulation of animal temperature is set at a higher degree than in the normal state and maintained steadily at that point, is overthrown by the well-known instability of the temperature during pyrexia. The instability must be referred to augmented irritability of the cutaneous vessels or their nerves, which is really observed in man, and which Senator has proven in animals, contrary to the former idea of vaso-motor paralysis. The absence of sensible perspiration during the febrile state, is not of much influence on the high temperature, as the latter commences to fall during the crisis before the critical sweat occurs, and as artificially induced perspiration does not lower the febrile heat. The absence of visible perspiration during most fevers, Senator tries to explain by the *non-formation* of yet unknown substances, which being excreted by the sweat-glands, are to them their normal stimulant.

Before entering upon the treatment of the febrile process, Senator speaks at length of the nosology of fever, which morbid process he considers, as we understand him, as in reality consisting of several essentially independent processes, any one of which may be absent in an individual case; if we should except to this statement the pathognomonic rise of temperature, and consider the latter as the essence of fever, would cholera be considered a febrile disorder, as in that disease the internal temperature is increased? For the details of this train of reasoning, we must refer to the original.

In the treatment of fever he lays down these three indications: 1. Reduce the temperature, and thus avoid the consequences of too great a heat. 2. Diminish the waste of albumen. 3. Combat the heightened irritability of the cutaneous vessels. As the former two subjects are foreign to the scope of the Journal, we will not consider them at present, since, besides, nothing original is contained in them. The third object Senator tries to obtain by paralyzing temporarily the cutaneous vessels *by means of sinapisms* during the abstraction of heat by cold baths. Another

method, filling both the first and the third indications, from which he has seen good results, is to coat the entire cutaneous surface with impermeable substances, a procedure not as dangerous in man as in animals, at least according to his experience, and certainly efficacious. Amongst remedies employed against fever, the author speaks highly of the subcutaneous injection of an aqueous, slightly acidulated solution of sulphate of quinine.

II. With the presentation of a case of simple febricula, Winternitz commences his remarks on the cutaneous radiation of heat, which he measures by means of an instrument devised by him — the *calorimeter*, consisting of a square wooden box with double walls, the enclosed air of which is warmed by the radiation from the skin, the temperature being determined by means of thermometers, the bulbs of which are in the box. With this apparatus he had previously shown that the cutaneous loss of heat may fall below the normal point by 60 per cent. or more, and on the other hand exceed it by 90 per cent. or more, according to the state of contraction of the peripheral vessels. On the patient presented he found a reduction, of about 8.4 per cent., at a time when the initial rigors had passed away, and the internal temperature was rising; in other cases he had observed a still greater diminution of the loss of heat during the chill, the above figure being an average from three measurements, on the surface of the epigastrium, the arm and calf; whether this average, however, is the mean number for the entire cutaneous surface, the author does not establish. The normal loss of heat, of course synonymous in the end with its production, equals, according to Helmholz, ninety-six units of caloric per hour, a reduction of which by 8.4 per cent. would amount in twelve hours, the approximate period of the cold stage of that patient, to a retention of 96.768 units. Now, as but 44.82 units of caloric are needed to raise the temperature of a man of 54 kilogrammes—the weight of the patient—by 1° C., it is possible that the observed rise of 1.6° C. was entirely due to the abnormal retention; and even if we admit a greater radiation from some parts of the body, the result may be the same or even higher, as we figured on a reduction of but 8.4 per cent., while in reality this is greater during the chill.

The assumption that the rise of temperature during the chill is due to augmented tissue change during that period, Winternitz refutes, as the excretion of urea is not always increased during that time, and if it is, it is simply the result of an increase in the amount of water excreted by the kidneys, on account of the augmented blood-pressure. He, on the contrary, explains the *pyrogenesis* by a primary contraction of cutaneous vessels, either from the influence of cold or from some internal cause increasing the irritability of the vaso-motor nerves. The peripheral cutaneous nerves being thus rendered anæmic, the patient has a sensation of cold, against which he tries to protect himself by surrounding himself with poor conductors of heat, thus still more diminish-

ing the cutaneous loss of heat. But in the normal state a diminution in the radiation from one part of the cutaneous surface is compensated for by increase from another — *the faculty of compensation must therefore be impaired before fever can occur.* The cause of this impairment he seeks either in the augmented nervous irritability or in the character or intensity of the irritant, and illustrates this point by an experiment, in which the cutaneous loss of heat was partly prevented in a man by protection with woolen cloths. Within fifteen minutes the temperature began to rise, the pulse became accelerated, but the occurrence of real fever was prevented by copious perspiration.

In intermittent fever, though of an entirely different ætiology than febricula, the cause of the augmented temperature is also to be sought in the primary retention of heat. Accordingly relaxation of the peripheral vessels artificially induced during the cold stage ought to abort the attack, and this has really been accomplished by Ritter, by means of warm baths; by Fleury, by a heavy douche, and by Winternitz himself, by intense friction of the cutaneous surface. A further source of heat-retention is the lessened evaporation from the skin. In fever, also, is the irritability of the vaso-motor nerves increased, a fact observed both in animals (Senator) and man, hence the cutaneous vascularity undergoes alterations, and the acme of temperature by no means coincides with the maximum cutaneous radiation. Yet, in continued fever the temperature retains its abnormal height for weeks, while the loss of heat is not constantly depressed correspondingly; in such cases there must, therefore, be *another source of heat, an augmented production of the same.* This he attempts to trace directly to the influence of abnormally warm blood, which from the increase of velocity by the more rapid contraction of the heart, also stimulated by the high temperature, loses less heat in passing through the cutaneous vessels, but he overlooks the fact that in the same time a greater quantity of blood traverses those vessels and undergoes the cooling process.

He admits, however, that the increase of tissue change, as calculated from the excretions, is insufficient to account for the excessive calorification, and takes refuge, therefore, in Murri's theory of the *occurrence of extraordinary biochemical processes* during fever, which is but another form of Senator's hypothesis of the consumption of stored-up forces of tension. With this *question* as to the nature of fever, which the author, however, seems to consider a *solution* of the problem, ends the practical part of the lecture; the rest is merely speculation on the consequences of that hypothesis. Like Senator, Winternitz also reasons that the term fever includes many essentially different processes, basing his arguments mainly on the ætiological aspect, and assuming that the extraordinary biochemical processes (which are yet to be proven) may and do vary in different fevers, and that the rise of temperature is owing to different causes in different febrile processes. If we are to adopt this view, it will be necessary to dis-

card the term fever and classify according to their ætiology, febricula, intermittent, and typhoid fevers, etc., as different diseases, but having in common some few symptoms, as increased formation of urea, *rise of temperature*, etc. The latter would in that case be considered in the same light that we now regard cough in pulmonary affections.

III. Dr. Wood opens his lecture with the avowed intention of proving that the nervous and circulatory disturbances in fever are the result of the elevated temperature, and this he attempts to prove by establishing the truth of the propositions, that external heat produces in the normal body similar derangements of the nervous and circulatory systems; that heat locally applied to the brain and heart, disorders their activity like in the febrile state; and thirdly, that all these morbid phenomena disappear on the withdrawal of heat. The arguments which he offers, drawn both from his experiments and those of others, leave no doubt that these propositions are really the statement of facts. Yet the tone appears too absolute, when he says in regard to the third proposition, "what could the bath do but withdraw heat?" The fact alone that the effects of cold water on the febrile temperature reach their acme generally *some time after the bath*, would show the contrary, and for a further confirmation we need but to refer to the article by Schueller, abstracted in this journal (April, 1875, p. 298). But admitting that an abnormally high temperature *does* cause disturbances similar to some seen in fever; admitting also that "fever and excessive bodily temperature are synonymous," it is not to be inferred that all febrile symptoms are the consequence of the abnormal heat. For fever is ushered in by a period of *malaise*, by vaso-motor spasm, as manifested by chills, etc., before the temperature has yet risen; in fact, we have seen that Winternitz traces the increase of temperature to vasomotor spasm as its first cause.

In the next place, Dr. Wood refers the cause of the pyrexia to increased chemical movements, a statement that overlooks the experimental results of Senator, that tissue change and calorification are not in any definite relation in fever. The use of the word "altered," when speaking of the chemical changes, would disagree less with the facts known at present.

The next few pages are filled with a very clear discussion as to the *hæmic* or *neurotic* origin of fever, and the conclusion arrived at is that while we cannot positively deny that in some cases fever is produced by the action of a morbid agent circulating in the blood or the tissues themselves, in other cases the febrile disturbances are the result of a primary impression on the nervous system. In proof of the latter, Wood refers to ordinary surgical fever, and more especially the so-called *urethral* fever, the starting-point of which is the introduction of a catheter in a sensitive individual, without there being in either case a morbid agent in the blood. He mentions also the curious instances sometimes

observed, in which all stages of fever are limited to one side, or even one extremity.

Wood now reviews the experimental results of Heidenhain, who had found that

1. Irritation of a sensitive nerve causes a rise in blood-pressure, but a fall in temperature.

2. This fall occurs in the posterior part of the body, even after the circulation has been cut off by forcible compression of the aorta.

3. When, in an animal which has been thrown into a high fever by the injection of putrid matters, a sensitive nerve is stimulated, a rise of blood-pressure occurs as in the normal state, but no change of temperature.

The theory by which Heidenhain attempts to explain these facts, viz., that irritation of a sensitive nerve stimulates the centre of the vaso-motor nerves in the medulla, whence results an acceleration of the blood-current, is manifestly incompetent to explain the facts observed. But Riegel pointed out subsequently that even the facts were dependent in a great measure on complicating conditions of the experiments; at least he was not able to confirm them in all their details.

As Wood remarks, similar experiments had previously been made by Mantegazza (*Gaz. Lomb.*, Nos. 26 and 29, 1866), but they were conducted in a rather loose manner. In Wood's own experiments the fall of temperature commenced only *after* the disturbance of the circulation, so that he concludes that the former is independent of the latter, and due to a direct influence of the nervous system upon the heat-producing function of the body. But since Wood does not seem to have made any comparative experiments, the question arises: Was the constant though slight fall of temperature which he observed due to *his* stimulation of the crural nerve, or to the binding of the animal and the insertion of the thermometer into the *peritoneal cavity?* If Wood cites the fall of temperature after accidents in man in support of his view, it may be objected that in such cases there is always present a disturbance of the circulation, distinct, though but little understood, which we term "shock;" especially does this occur in gun-shot wounds, in which Redard found the most marked reduction.

The result of section of the cord on the temperature is next discussed, and reference is made to the careful experiments of Naunyn and Quincke, who found a marked cooling of the body after division of the cord, if the surrounding temperature is below the heat of the body. If, however, the temperature of the room was above the normal degree of animal heat, the animals became intensely febrile. The same experimenters made a crucial test of this by placing the *uninjured* animal in the warm box without elevating its temperature by that procedure; if hereupon the cord was divided, and the former conditions kept up, a strong rise was soon apparent. The cause of the reduction of temper-

ature is to be sought, according to Wood, in diminished heat production as well as increased heat evolution. Some late experiments, however, of Murri (*Sulla Teoria della Febbre.* Fermo, 1874; abstracted in *Journ. of Anat. and Phys.*, May, 1875) would overthrow that view in part, since he found that dogs warmed the air of the calorimeter much less *after* section of the cord than before that operation, while still their *internal* temperature was constantly sinking, which plainly shows that section of the cord *diminished* the loss of heat, as well as its production.

At any rate, Wood traces the fall of temperature, after section of the cord, to injury of the vaso-motor nerves, since *when the point of section falls above the vaso-motor centres, it is followed by a decided primary rise.* This remarkable experiment of Tscheschichin (*Reichert's Archiv*, 1866), who obtained that result by cutting the medulla oblongata at its junction with the pons, has been confirmed by Wood. The integrity of the vaso-motor centres was proven in these experiments by the possibility of reflex excitation of the vaso-motor nerves, as well as by the autopsy, which showed the point of division above the vaso-motor centres. In this place, Dr. Wood, with the laudable intention of stirring up some English writers, has ventured the assertion that no resumè of the late researches on the vaso-motor centres in the medulla has appeared in the English language. A glance at the April number, 1874, of this journal will suffice to refute that assertion.

Bruck and Guenter have likewise confirmed these results, failing, however, in some instances, but which failures were attributable to other causes, and do not invalidate their success.

Next in order is a short discussion on the vaso-motor centres, the governing centre of which Wood locates in the medulla, while he agrees with others who claim the existence of inferior centres in the entire cord. It sounds strange, however, to hear Wood deny to the latter "the power of generating vaso-motor impulses." According to the views now entertained of the nervous system, centres are not supposed to have any function but that of reflex transmission, *i. e.*, conversion of a centripetal impression into centrifugal impulse. But the further details of this subject are not new to the readers of the JOURNAL.

From the above facts the author concludes that there must be in the pons, or above it, a nerve centre, whose function it is to inhibit or repress the chemical movements of the body, *i. e.*, the production of animal heat. The influence of this inhibitory centre would be removed in section of the medulla or cord, hence the rise of temperature in the former case, while in the latter it is prevented by the unavoidable vaso-motor disturbances. Wood criticizes the views of Bruck and Guenter, who referred the rise to irritation of the medulla by the section, and accordingly claim to have produced the same result more easily by inserting needles into the medulla and permitting them to remain there. As Wood observes, the nerve substance was actually wounded in

this experiment, and the paralysis must have extended beyond the wound by reason of the pressure exerted. This inhibitory centre Wood believes not to act directly upon the tissues, but probably to possess a controlling influence over inferior centres in the cord, whose function it is to preside immediately over chemical activities, the medullary and spinal centres thus acting in opposite directions, in a manner comparable to the inhibitory centres of Setchenow. While Wood leaves off at this place, it seems to us that his view is supported by many facts, for instance the local reduction of the temperature, which Bernard (*Systeme Nerveux*, t. II.) obtained by section of the fifth nerve or of the isolated anterior or posterior roots of the spinal nerves. According to the same experimenter, however, a different influence is exerted by the sympathetic, section of which is always followed by an elevation of temperature, which is not altogether dependent on the vaso-motor disturbances, since it is observed even after the ligation of vessels, and does not correspond in its maximum and minimum to the course of the hyperæmia.

Clinically, lesions of the optic thalami and pons are followed by a rise of temperature according to Bastian (*Lancet*, Oct. 31, 1874), but to refer this to vaso-motor paralysis would involve serious contradictions. In fact, so apparently contradictory are the thermometric results of different nerve lesions, that Wood feels justified in concluding that the thermometric consequences of section of the so-called sympathetic nerves are always due to division of the "chemical" fibres.

In accordance with the hypothesis announced, that the thermometric changes on stimulation of the medulla are independent of the circulation, Wood found it impossible to alter the temperature by irritation of sensory nerves after severing the medulla from the pons. But, on the other hand, he obtained a decided fall of temperature by irritation of a sensory nerve in animals rendered febrile by injection of pus, disagreeing in this respect with Heidenhain, who saw no thermometric change in such a case.

By a knowledge of the inhibitory centre, Wood considers it an easy task to explain many pathological states ; for instance, cerebral rheumatism, of which he cites a striking instance in his lecture. This affection he supposes to be due to an involvement of that centre (?) in the rheumatic process with paralysis of the same, whence the great heat. Irritative fever would start in an impulse conveyed through an afferent nerve to the centre, which is thus first excited to action, and a chill caused. But in reality we do not know that fever is preceded by an abnormally low temperature, which would be the result of activity of the centre, and besides, Dr. Wood seems to overlook the fact that a chill is often accompanied by a rise of internal temperature. "If the irritation be more persisting, the inhibitory centre is weakened or paralyzed, and an elevation of temperature results." In analogy Wood refers to the occurrence of reflex convulsions or reflex paralysis, according to the grade of irritation to which a sensory

nerve is subjected. But the very occurrence of this reflex paralysis, as it was once assumed by Brown-Sequard, is at present a matter of serious doubt. Wood, however, admits that an antagonistic force to the inhibitory centre is likely to exist, to reason by analogy, and may also have a share in the production of fever; whether, however, this force is the chemical tendency of the tissues themselves, or whether the *depressor* is antagonized by an *accelerator* chemical nerve is as yet a matter of doubt. Certainly some substances seem to act on the tissues themselves; thus our author found a reduction of temperature by nitrite of amyl after division of the cord, and the same was proven for alcohol by Binz, etc. Murri has also succeeded in producing the same grade of fever in dogs by injection of pus before and after section of the cord. Wood himself did not find the inhibitory centre paralyzed in pyæmia, since he could lower the temperature by stimulation of the sensory nerves. If Heidenhain did not succeed in that, it was owing probably to his having employed feeble currents, while Wood made use of a decidedly intense irritation. Still, Wood claims for the centre, if not paralysis, at least a state of paresis in pyæmia; but even this is a matter of doubt in view of the fact that Murri could obtain pyæmic *fever* after separation of the tissues from the inhibitory centre. Besides, Wood obtained a greater reduction of temperature in the feverish than in the normal animal by stimulating sensory nerves, and still he finds it "an almost necessary inference that in septic fever the inhibitory centre has lost in part its susceptibility." This rashness of conclusion is an unpleasant feature in an otherwise highly creditable American production. H. G.

IV.—BEARD AND ROCKWELL: ELECTRO-THERAPEUTICS.

A Practical Treatise on the Medical and Surgical Uses of Electricity, including Localized and General Faradization; Localized and General Galvanization; Electrolysis and Galvano-cautery. By Geo. M. Beard, A.M., M.D., and A. D. Rockwell, A.M., M.D. Second edition, revised and mostly rewritten, with nearly two hundred illustrations. Large 8vo. 794 pp. New York, 1875: Wm. Wood & Co. Chicago: Jansen, McClurg & Co.

In writing a notice of the second edition of a well-known work, it is rarely necessary to go much beyond generalities. It usually differs from its predecessor only in that the author has remodeled a few paragraphs, added a little here and there, so as to bring it more nearly up to the existing state of knowledge on the subject

throughout the world, and has introduced such amendments as have been suggested by the previous criticisms and the general reception of the book, but in substance and size it has received very little alteration. The reviewer may expand a little on the general treatment of the subject by the author, and notice, perhaps, the more prominent alterations and omissions, and the general appearance of the volume, and his work is done—it has received sufficient attention. Anything farther would be gratuitous, and almost necessarily to a great extent a rehash of previous criticisms, if the work had ever received an adequate review.

The case is otherwise, however, when, as in the present instance, the book has been almost entirely rewritten, and enlarged to nearly, if not quite, double its former size. This is what Drs. Beard and Rockwell have done. We recognize their former work only here and there amongst the pages of their present one. One or two of the old chapters are retained without alteration, but the majority are so enlarged or are so combined with new matter as to be almost unrecognizable. The former edition scarcely runs as a framework through the present. As illustrating the comparative fullness of treatment of the subject in the two, we can take as examples the sections on electro-physics and electro-physiology, which, in the former work, occupied a little over ninety pages, but which fill over two hundred of the larger-sized pages of the present one. Nearly the same proportional increase is to be observed in other portions of the volume.

It will be impossible, of course, to give a detailed review of all the noteworthy features of the work of Drs. Beard and Rockwell in a notice like the present. We can only promise to mention a few of them. Their volume in its present form is the most extensive work on the subject in our language, dealing more especially with its practical, rather than its theoretical and purely scientific, aspects. Its authors are practical men, *par excellence*, in this department, but they have not neglected the important theoretical and scientific considerations which underlie all practice in rational medicine, and especially so in this particular department, if it can be called such. We may mention, however, one point in which there is perhaps too great a concession to empiricism. The authors, after their introductory remarks to the section on electro-physiology, in which they make some very just and judicious remarks in regard to its value and importance to the practitioner, state that they do not "subscribe to the notion, quite popular with some, that electro-therapeutics must be based on electro-physiology," and claim that, though reciprocally assisting each other, they must be kept apart in the mind of the student. It is true, we admit, that the medical value of electricity has been empirically discovered, and that it is at present largely so applied, but we are not willing to allow that this is always to be the case, or that we are to content ourselves with this condition of things. And we only notice this point here because it seems to us that the authors, by claiming what they do, degrade their subject, and would throw

electro-therapeutics altogether out of the pale of truly rational medicine. Electro-physiology, they say, is a science of experiments, not of experience, but experiments are only attempts at reproducing the facts of experience under more favorable conditions for observation. Their distinction is not well taken.

With this exception, we have no special criticisms to make on this part of the authors' work. They give a very clear account of the principal theories in regard to animal electricity, those of DuBois Reymond and Radcliffe, together with the comparatively recent researches of Prof. Trowbridge, of Harvard College, which seem to throw doubt on these hypotheses. They do not mention the objections of Hermann and others, and it would be obviously unnecessary to attempt to give in a work like this even a brief account of all the various investigations of this most difficult and complicated subject. Their explanation of electrotonus and its modifications is clear as far as it goes. They seem to favor the theory that they are due to the electrolytic action of the current, but they do not mention in this chapter the ideas of Legros and Onimus in regard to the explanation of these effects by currents of polarization.

The chapters on the influence of electricity on the various organs and parts of the body, and the special senses, are very full and contain some interesting original observations, besides what is derived from other sources. For example, Drs. Beard and Rockwell give an account of experiments performed in regard to the effects of the galvanic or faradic current on the pneumogastric and sympathetic in the neck, a method largely recommended by some, and ridiculed and condemned by others, for the treatment of various forms of disease. They admit freely the impossibility of accurately differentiating the action of the current on each of these and other contiguous nerves, but the results of their investigations seem to show both to ordinary observation of symptoms and the employment of instruments of diagnosis like the ophthalmoscope and sphygmograph, positive results on the circulation and vaso-motor nerves. They also publish experiments, perhaps more curious than practically important, on the electric reaction of the optic nerve, and adopt in the main from their own researches the conclusions of Brenner as to the auditory phenomena produced by the current, that they are due to a direct action on the nerve of hearing, and not to muscular contractions, as held by Wreden and Loewenburg, and later by Cyon. Other original series of experiments detailed here are those in regard to the action of electricity on the unstriped muscles, in which the differential action of the two kinds of currents, induced and constant, and that of the positive and negative poles were noted ; those in respect to its action on the blood in forming clots, a question of importance in electro-surgery, and those on its action on nutrition. The authors found that the positive pole acted more strongly on the unstriped muscular fibres in producing contractions than did the negative, and that this action was more

decided with constant than with induced currents. This they claim as an original discovery, and hold that it has a practical importance in the treatment of congestive disorders of the uterus.

The section on electro-therapeutics, which comprises the larger part of the volume, nearly five hundred pages altogether, opens with a lengthy historical chapter, containing, also, general considerations on the subject. This chapter will, we think, be apt to excite some criticism. It is in some measure an apology for the specialty, perhaps all the more needed because of the reception it is likely to meet in some quarters. It must be admitted that at the present day there are those in the regular medical profession, and particularly among its older members, whose distrust and suspicion of the new remedial agent is only to be measured by their ignorance of it, and others still who, while admitting it to have some value in certain cases, still preserve a latent but ill-concealed prejudice against all who claim for it any virtues but those they have been compelled to allow. Nor is this altogether to be wondered at, for electricity as a healing agent has been, and, to a great extent, still is, in bad company. The popular faith in the mysterious and the pretentious has made it easy for charlatans and empirics to utilize this means for their own purposes, and this fact, as well as the obscurity and novelty of the method, has kept it under suspicion with cautious medical men. There are others at the present time who feel called to rebuke enthusiasm in any new field, and particularly in one which claims to introduce a new specialty into medical practice. All of these will find much to criticize in our authors' remarks on the introduction of electricity into recognized therapeutics.

We have already mentioned what seemed to us a mistake on the part of the authors of this volume, in even partially depreciating the value of the study of the physiological action of electricity, as compared with that of its therapeutic action. The criticism we have to offer on this chapter is that a little too much of the same idea seems to run through it, though in this matter it must be said, in justice to Drs. Beard and Rockwell, that they are not consistent with themselves. It is true, as they say, that electro-therapeutics has been to a certain extent in advance of electro-physiology, but we still have a hope that if the treatment of disease is ever to be according to exact physical and physiological principles, this agent of electricity is to be one of the means of bringing about the happy result, and we dislike to have that expectation discouraged, either by enthusiasts or skeptics in regard to its powers. Certainly it is the painstaking and careful investigation (no matter that some of it has, perhaps, been misdirected) of scientific workers, among whom we would include Drs. Beard and Rockwell, that has brought the subject generally before the regular profession and made it respectable, and in this manner alone, more has been done for its advancement than by all the lucky blundering of mere empirics since the beginning of the world.

The succeeding chapters on the general therapeutic action of electricity, and as to its use as a remedy, are full of valuable practical suggestions, and worthy of careful perusal. The matter is nearly all additional to what was contained in the former edition; the three following chapters on the principles of electro-diagnosis, the comparative value of the galvanic and the faradic currents, and electro-therapeutic anatomy are mainly the same as before.

The chapter on apparatus is quite complete, and gives descriptions of a number of the principal machines in use in this country and Europe up to a very recent date. That on localized electrization is an expansion of the chapter on the same subject in the former volume, and though it contains new matter and observations, it hardly calls for extended notice here.

The general electrization of the authors in the former volume is described in this later edition as general faradization, and is distinguished from still another method which is designated central galvanization, and which was not described until after the first publication of the work. The method of central galvanization was first, we believe, described in the *N. Y. Medical Record*, in December, 1871, and subsequently in the *Archives of Electrology and Neurology*, and other publications. It consists simply in so placing the electrodes that the head, the cervical ganglia of the sympathetic and other nerves, and the spinal cord, are successively brought between them and traversed by the current. The negative pole is usually placed at the epigastrium, while the positive is passed over the parts named in a descending order. The idea is to bring all parts of the central nervous system under the influence of the remedy in such conditions as when the special portion diseased cannot be accurately determined and the treatment localized. It is the counterpart of general faradization, the constant current being employed instead of the faradic; and as it is intended that the current should affect the centres rather than the peripheral nerves and the muscles, the application is less general. Very powerful tonic effects are claimed for this method in cases of nervous exhaustion, or in which it is a leading symptom. Where great muscular debility, on the other hand, is the principal trouble, the general application of the faradic current is often preferable. Alternations of both methods were found in some cases to give the best results.

To the objections that have been raised against this method by Althaus, and against applications to the brain and the sympathetic by Cyon, Brown-Sequard and others, our authors reply that strong currents and protracted applications may be hurtful and even perilous, but that from their own experience, as well as from all analogy with other remedies, it does not follow, therefore, that cautious and judicious applications are not beneficial; all potent remedies are dangerous when used dangerously. To the theoretical objections sometimes offered against the value of electrization of the brain, they reply, that, even granting what is not true, that cur-

rents cannot penetrate the brain, this would be no reason for abandoning a method of treatment that the experience of careful observers has demonstrated to be of value.

The claims of our authors for originality in these two methods, and their right to rank as distinct forms of treatment, may, perhaps, be questioned by some, but hardly, we think, with justice. They certainly have called attention more generally than any others to the value of these methods, and their names will always be associated with them. A good statement of their claims in this respect, and the grounds on which they are based, is given by the authors in the chapter on the history of electro-therapeutics, pp. 227 to 232.

Two short chapters are given to the subjects of static electricity in medicine and electric baths. In regard to both of these, the authors hold, with, perhaps, the great majority of the profession, that they possess no special advantages, under ordinary circumstances, over the usual methods of applying electricity in cases of disease, or at least that their claims must be considered as still undecided. The expense and comparative inconvenience of these methods will, in all events, preclude their general adoption by practitioners, and limit their employment to a few specialists in this department.

The remainder of the book, with the exception of the section on electro-surgery at the end, is given up to the subject of the application of electricity in the different forms of disease. Much of the matter is the same as in the former edition, but this part of the book has been remodeled and many additions have been made. The chapters on insanity, diseases of the skin, diseases of children, diseases of the heart and lungs, and that on miscellaneous medical diseases, are either altogether new or so rewritten and remodeled as to be virtually so, and changes are to be seen in every chapter in this part of the book. Since the first publication of their book, Drs. Beard and Rockwell have published a small work largely devoted to the electrical treatment of skin diseases, and which received notice in this journal for July, 1874. In the chapter on the same subject they give still more fully the results of their experience in this class of ailments. The chapter on children's diseases is also worthy of careful perusal, as giving the results of the authors' experience, though it contains proportionately less new facts and observations than the other.

In all the reported cases we see the same honesty of statement and apparent care to properly estimate therapeutic facts that was observed in the former volume. Though enthusiastic in regard to their methods of treatment, the failures seem to be reported as frankly as their successes, and the authors seem generally sufficiently guarded in their diagnoses, when the success appears to be greater than could be expected from the general experience of the profession.

We have noticed in this article only a part of the general features of this work. The opening section on electro-physics, and

the closing one on the surgical uses of electricity, hardly require any extended remarks from us. The first seems to be a very satisfactory exposition of the general scientific principles, a knowledge of which is so useful, and, indeed, almost indispensable, to every one who would utilize electricity in medicine. The latter is as complete in its way as the other parts of the book; the history of the subject is first given, then follows a description of the apparatus and the operative procedures, with directions and rules for operating, with remarks on the advantages and inconveniences of the different methods. Some space is given to the plan of electrolysis of malignant tumors employed by Dr. Beard, and called by him, "working up the base." This, however, has been described elsewhere, and we need not dwell on it here. The section, on the whole, would form by itself a convenient treatise on electro-surgery.

Taken as a whole, this work of Drs. Beard and Rockwell is the most complete, as it certainly is the largest, work on the subject in our language. It is not written exactly in the spirit that some other treatises are, that of a cautious, scientific skepticism, but rather in that of enthusiastic specialists—practical, rather than strictly scientific men. This does not, however, in our opinion, detract from its value. Enthusiasm in a good cause is always useful, and there is always enough of the other spirit in the profession to counteract any evil effects from its excess.

There is, perhaps, throughout the book a little too much dwelling on the specialty, a too frequent use of the words "electrotherapeutist," "master in electrology," etc., which will excite unfavorable comment in some quarters. Medical practitioners are not always favorable to medical specialties, particularly those which have been associated in their minds, even indirectly, with any form of irregular practice. Nor, though we hold this in the present case as an altogether needless prejudice, do we ourselves consider that the actual state of electro-therapeutics calls for the limitation of its practice in the hands of a particular class in the profession. There is no reason why every physician should not utilize it to a certain extent in his daily practice, leaving only those cases requiring special treatment with elaborate and costly apparatus to the special practitioner. And whoever now rejects it, through prejudice or ignorance, disarms himself before very many forms and emergencies of disease.

We hope the time will come when the proper therapeutic applications of electricity will be as familiar to every physician as the uses of the most common and well-known drugs, and it is by such works as the one under consideration that this result is to be brought about. In many respects it is one of the most practical and sensible books that has yet appeared on the subject, and if future editions increase in size and value as this one has over the former, it will be the leading work in its department.

V.—FREY: HISTOLOGY AND HISTO-CHEMISTRY OF MAN.

THE HISTOLOGY AND HISTO-CHEMISTRY OF MAN. A TREATISE ON THE ELEMENTS OF COMPOSITION AND STRUCTURE OF THE HUMAN BODY. By Heinrich Frey, Professor of Medicine at Zurich. Translated from the fourth German edition by Arthur E. J. Barker, and revised by the author. 8vo., 683 pp. D. Appleton & Co., New York. Chicago: Hadley Bros.

It is with pleasure that we notice an American edition of this work, appearing simultaneously with the translation in Great Britain. A work of this nature is almost a necessity to the accurate student of the minute structural anatomy of the human body, and although we have already in the field such a work as the *Manual of Histology* edited by Stricker, and perhaps one or two others, they hardly occupy the same ground as this, or fill its place. Stricker's manual is a collection of separate papers on the different organs, each independent of each other, and many of them going to a considerable extent into the minute descriptive anatomy of the part; the work before us is a general treatise on the whole subject of the elementary structures of the body. It is therefore more consistent and uniform in the treatment of its subject, and more useful in some respects for reference, while it is, at the same time, less bulky and inconvenient than the American edition of the other work.

The translator has been able, by delaying the appearance of the work, in its English, to the present, to include all the latest revisions of the author, bringing it before the public identical and simultaneously with the latest enlarged German edition. Though such a work has been long needed in our language, the delay in its appearance is amply compensated for by this advantage.

Of course in a progressive science no work can include all the latest discoveries up to the time of its publication, and this one contains many important omissions, some of which, perhaps, might have been avoided, but it is none the less a valuable addition to the literature of the subject—not too rich in our language—and a standard work.

Inasmuch as the extensive literature of this subject is almost wholly in the German and French languages, the translator has rendered, to both his own countrymen and to ours, a genuine service in the English reproduction of this book.

VI.—SHORTER NOTICES.

I. Annual Address before the Society of the Alumni of the Medical Department of the University of Pennsylvania. By Cornelius G. Comegys, M.D., Lecturer on Clinical Medicine in the Cincinnati Hospital, etc.; with the Proceedings of the Alumni Meeting of 1875. Philadelphia: 1875, 79 pp.

II. Cerebro-spinal Meningitis. Report to the State Board of Health upon an Epidemic in Monroe and Lenawee Counties, Michigan, and a study of some other facts relative to the cause of the disease. By Henry B. Baker, M.D., Secretary of the Board, etc. Reprinted from the Second Annual Report of the State Board of Health of the State of Michigan, for the year ending September 30, 1874. 8vo., 76 pp.

III. The Polar Action of Electricity in Physiology. By John J. Mason, M.D. New York (Reprinted from the *New York Medical Journal*, December, 1874). 15 pp.

IV. Medical Addresses. By Benjamin Eddy Cotting, A.M., M.D., Harv. Boston: 1875, David Clapp & Son. 123 pp., 8vo.

V. Circular No. 8. War Department, Surgeon-General's office, Washington, May 1, 1875. A Report on the Hygiene of the United States Army, with Descriptions of Military Posts.

VI. Rest in the Treatment of Nervous Disease. By S. Weir Mitchell, M.D. Being No. IV. of the Series of Clinical Lectures edited by Dr. E. C. Seguin, and published by G. P. Putnam & Sons, New York. 19 pages.

VII. Medical Chart of Temperature, Pulse, Respiration, and Regions. Cincinnati Case Record Co., publishers, 224 Laurel Street, Cincinnati, O.

I. This very readable address of Dr. Comegys' contains, besides other suggestive matters, certain observations which fall properly under our notice. In speaking of that aspect of medicine, the object of which is to *prevent* rather than *cure* disease, he says: "I feel constrained to speak on another range of human action, upon which depends so much of the happiness and prosperity of the social and political state, but for the regulation of which we cannot suggest any statutory provision. We are, however, under the gravest responsibility, from our professional knowledge, to point to its possibilities for the production of great

individual and public calamity. I allude to the perversion of the mind as dependent upon disorder of its material instrument—the brain" (p. 14). This subject is followed out into several interesting relations—especially into a lack of will power, as depending on an unhealthy or defective brain structure, and disordered nutrition of the brain; or on unequal development of the same, depending on excessive play of the passions, or indulgence of appetites, which not only enfeeble the nervous system, but involve the prostration of the will. There is—so Dr. Comegys seems to think, and, we believe, correctly—a tendency in present modes of life to destroy the healthy equilibrium which should exist between the will and the emotions, as they are represented in the living structure of the brain. This state of things is peculiarly liable to occur in the cases of those who are under the burden of great responsibilities, either in private or public affairs, especially where there are temptations of various kinds to courses of action which imply a surrender of the dominance of the will, and the excitation, unduly, of either the pleasurable or painful emotions.

These things tell on the structural, and, by consequence, functional, integrity of the brain, and it is to this practical fact—its signs, and too often its melancholy consequences—that Dr. Comegys would call the attention of the profession. We have regretted not to be able to give the lecturer's thoughts in his own words, but we could not do so without giving more space than we can afford at this time. Though the line of thought indicated is not essentially novel, yet it is important, and serves to multiply the objects, and to enlarge the sphere of duty, of the medical philanthropist.

We commend the hints contained in this elegant address to the attention of the profession.

II. The paper by Dr. Baker, on *cerebro-spinal meningitis*, containing 76 pages, is a reprint from the *Second Annual Report of the Board of Health of the State of Michigan*, for 1874. It contains an account of an epidemic of this formidable disease, as it occurred in the counties of Monroe and Lenawee in that State in 1874.

The disease, as observed in the epidemic described, presented no peculiar features worthy of mention. One of the first questions raised is as to its communicability. This question is answered very properly in the negative. The eighty-eight cases recorded are variously analyzed in an instructive way—under the heads of age, sex, dates of death or recovery, duration of the disease, etc., together with the resulting averages.

Dr. Baker then passes to a review of the symptoms of the disease as it appeared in the epidemic in Michigan. But there is nothing novel in the account worthy of mention when it is compared with others.

A quotation is made from a report to the Medical Society of the State of New York, by Dr. T. H. Squire, for 1858, as to the

pathology of the disease, who holds that it consists immediately, in congestion of the brain and cord, and who thinks, however, very properly, that the most important question, admitting that congestion exists, is as to its cause.

The author discusses at some length the possible agency of ozone, as a cause of the malady, but with no positive results. Then the water supply of the affected district is examined, but without reaching any conclusions which seem to throw light on the ætiology of the disease.

Next the question of the part *fungi* may play in the causation of the disease is discussed, but in a very inadequate manner.

For our own part, after a protracted study of the question, extending over several years, and the results of which we expect some time to publish, we think this a promising direction in which to look, in seeking the peculiar cause of the disease. Next in order, the seasons of the year are spoken of in their ætiological relations. But we are prepared to show the disease is essentially independent of such influences.

Finally, our author considers at great length the probable agency of ergot, and allied substances, that occasionally adulterate breadstuffs, and is evidently inclined to admit the ergot as at least one cause of the disease. But interesting as the review of authorities, in respect to the nature and mode of action of this agent, may be, yet we are constrained to say, that after a study of nearly every important epidemic that has been recorded, these histories show that whatever the cause of the malady may be, that it cannot be ergot. The cause is not known. All we feel justified in declaring at present is, that cerebro-spinal meningitis depends on a peculiar organic agent, probably vegetable in character, occurring, like the grape blight, for example, occasionally, and, if so, probably fungoid in character, and capable, when introduced into the blood under certain circumstances, of acting with sufficient intensity, and in a specific way, upon certain parts of the nervous system, as to impair or even destroy life, as other poisonous agents are known to do. But these conclusions are mere inferences, that may or may not be confirmed in the course of further observation.

The time has come when mere skeleton reports, such as this of Dr. Baker's, have so multiplied in respect to striking diseases like the one under consideration, that they have comparatively but little value.

III. This paper is one of the very few contributions to the rather abstruse questions of experimental electro-physiology that have been made in this country. We say, very few; for with the exception of Dr. Mason, we know of scarcely any one scientific worker in this country, who takes up this line of investigation *con amore*, without having some particular practical object more especially in view. The lack of laborers in this field is all the more striking among the English-speaking peoples, when we

consider how diligently it has been cultivated in Germany, and also in France.

Dr. Mason gives in this paper an account of a series of experiments performed by him according to a method of his own, to determine whether current direction or polar action respectively, caused the effects of electricity in stimulating nerves and muscles. He gives a short account of the several views held in regard to this point; those of Pflueger, Chauveau, Legros and Onimus, and Radcliffe, and then proceeds to detail briefly his own experiments, illustrating them with a series of myographic tracings, showing the effect of closing and opening both ascending and descending currents in the gastrocnemius and sartorius muscles of the frog, specially prepared, and isolated from the body to exclude the chances of error from derived currents and reflex action. His conclusions from these investigations seem to agree with those of Chauveau: "that mild currents irritate only at their point of exit, and not by an effect produced all along the course of the nerve, due to the direction in which they pass." The contractions sometimes observed on opening the circuit are attributable to secondary currents caused by polarization of the electrodes, when they are polarizable; not currents of polarization such as are held by Onimus and Legros to be the cause of the analectrotonic phenomena.

Dr. Mason ends his paper with an application of his theory to the vaso-motor nerves, as illustrated by experiments on the frog's tongue. We do not, however, see the force of his objection from this to peristaltic action, the assumption of which in the smaller vessels is in our opinion allowable on altogether different grounds from those of the supposed influence of the direction of the current in physiological experimentation.

IV. Dr. Cotting, the presiding officer of the Massachusetts Medical Society, has brought together and published in pamphlet form, with copious notes, three addresses, delivered at different periods before the Society, or one of its sections. Their titles are "Nature in Disease;" "Disease a Part of the Plan of Creation," and "My First Question as a Medical Student—Its Solution a Basis for Rational Therapeutics." This first question was, "What will be the course and result of the disease if left to itself without medicine?" and the essay is a plea against routine treatment and for the study of the natural history of disease. The advice given, however, "to strive unceasingly," to solve this question, may, if taken literally and acted upon, lead to serious consequences to the patient and physician. Nature is not by any means always a kindly mother; disease and death are as much in her order as health and life, and it is the function of the physician to combat these natural processes. Our hope of the medicine of the future is, that it will enable us to do so far more successfully than at present, and this result is never, we think, to be obtained solely by the expectant method. That such methods

meet with success in many cases, and that they are preferable in all respects to the often ignorant temerity of the old routine treatment is no doubt true, and is evidenced by the fact that we have in nearly every community, practitioners of a school whose practice, as far as it is consistent, amounts to very little more; but it is not by them that scientific medicine is ever advanced an iota, and lives are daily sacrificed to their ignorance and timidity.

Dr. Cotting's question is legitimate; but the essay is in some measure an *ex parte* argument, which it may be politic and even advisable to make before a society of physicians in practice — we do not say that it is — but which gives a false idea of the actual and ideal state of scientific medicine. While we believe in a true scientific skepticism, we see no need of admitting or even presuming the impotency of active remedial measures; a general distrust of medicine seems to us as far from the right on the one hand, as is the vulgar faith in specifics on the other.

V. Circular No. 8 is a bulky quarto of five hundred and sixty-seven pages. It gives an account of the physical and sanitary surroundings of the various military posts of the U. S. Army, and as these are scattered over a very extensive range of territory, and includes almost every condition of climate and altitude, it is therefore a very valuable contribution to the literature of medical geography and sanitary statistics. Such a work is of special value to medical officers ordered to posts with which they are unacquainted by actual observation or experience, and to those in civil life who have occasion to investigate climatic sanitary conditions. Many of the reports from post surgeons in this volume, contain very serviceable information in this regard. This volume will be very useful to every scientific physician in whose hands it may come.

VI. This memoir, as we are informed by Dr. Mitchell, is composed of lectures delivered at different times in the Infirmary for Nervous Diseases, at Philadelphia, of which he is one of the attending physicians. No other practitioner in this country, it is probable, is better qualified to speak authoritatively on such topics as the one embraced in this instructive paper. It is simply a statement of the function of *rest* in the treatment of certain nervous diseases.

Says the lecturer: "Rest and unrest have had their days, and fashions in medicine, but be you sure that he who can tell when the one is wanted and when the other, is a man who is a master in the ways of healing." Dr. Mitchell states very forcibly, not only the benefits but the dangers of rest. In respect to the latter, some of his remarks are so judicious that we will quote from them. He says: "When you put your patients in bed and forbid them to rise or to make use of their muscles, you at once lessen appetite, weaken, in many cases, digestion, constipate the bowels, and enfeeble the circulation. To say how all this arises, would need,

not a lecture, but a book, and I can only hint at what I might call headings for thought. Defect of circulation is the main thing to think about. A man in bed has his heart beats brought down in number and in force. Then there is for him no longer the constant pumping out of blood from active muscles, and these aids to the heart failing, the distant local circulations suffer, and the blood flows around the muscles and not through them, and the skin ceases to be flushed by exercise and becomes pale and shrunken. To be small one moment and large the next is a condition of health for the vessels, and this fails for the want of exercise, so that when a man lies in bed the vessels lose tone, and when he gets up of a sudden, this is seen in the way the blood column enlarges the lower vessels, and leaving the head, causes faintness. Of these well-known facts I remind you only that you may the more fully see why I dwell so much on the means which must be used with rest in order to avoid its evils."

This clear and practical account of the evils of protracted rest, or want of exercise, does not, however, apprehend, or at any rate does not state the real point of difficulty in such cases. "Defect of circulation is the main business to think about." But this does not go to the root of the matter. A mere look behind the "defective circulation" will show the ulterior conditions on which the defect mentioned depends. The whole thing is grounded in a change in the rate of nutrition, in muscle, etc., depending on a cessation of functional activity. According to the demand so will be the supply—in this case, *blood* supply. Is the diminution in blood supply primarily the cause of diminished and finally disordered nutrition, as Dr. Mitchell would seem to imply? In our view, the case is to be read at first just the other way, viz.: the diminished blood supply is a result of a diminished nutritive activity. But though the latter is at first the consequence, it becomes at last a *cause* of the former, and thus the circle of relations is completed. The question at bottom in these cases of protracted rest, is, how shall we maintain, not simply the circulation, but the *nutritive* activities of parts in a state of functional rest—because the supply of blood is not the whole matter. There must be a supply of materials, it is true, but there must be also a *demand* for them, and how can this be created while the parts are inactive? We do not mention this phase of the question raised, because we suppose it had not occurred to the author of this paper, but because, while it ought to have been stated, it has not been done. But it is impossible in this brief notice to review in an adequate manner this excellent and practical paper. The wise distinctions that are made or hinted at, as to the kind of cases — neuralgias for example — in which rest of the affected part is useful or even indispensable, and the methods of detecting and avoiding the evils of rest, are so well taken that we recommend them to the attention of all our readers. We would be glad to comment on them at length, but we have no space at present for this purpose.

If Dr. Seguin succeeds in procuring lectures as good in other departments of medicine as this of Dr. Mitchell's is in the one in which he labors, he will confer a benefit on the profession in issuing them.

VII. In our last number we noticed the Cincinnati Case Record Company's convenient pocket and office case records. We have received from the same parties a very useful form of medical charts, giving very convenient tabular forms for recording the temperature, pulse, and respiration, together with a history and diary of the case. We have nothing but approval for every device of this kind which may help to preserve accurate and thorough notes of cases, and serve, in this way, to collect and render permanent the experience of the physician.

Editorial Department.

"SYMPATHETIC NERVOUS SYSTEM."

IN the number of the first of May of the *Philadelphia Medical Times*, is a characteristic editorial article on the "Sympathetic Nervous System."

Its subject naturally brings it under our notice. It is written in the vivacious style and aggressive spirit, and with the customary want of consideration of relations and consequences that distinguish so many of the utterances of the active and versatile editor of that valuable periodical.

The article in question contains several statements with which we cannot fully agree, and calculated to mislead those who may read and accept them; and hence we feel privileged, to say the least, to offer a few remarks on them, and to which we are not moved by the slightest of personal considerations.

The writer objects, in the first place, to the term "sympathetic," as hitherto applied to a certain part of the nervous system—a name which is still employed by many, though in a different sense from that it formerly conveyed. Says the writer of the article:

"For many years the so-called sympathetic nervous system has been the ever-ready slop-shop of the baffled pathologist, out of which he has drawn ever-ready explanations for all the more recondite diseases of the human system. To be sure, the garments often did not fit very well, and the winds of controversy swept through their numerous rents with chilling force, yet to many minds a sham seems better than the open nakedness of confessed ignorance. Recently those imaginative children of the present — the electro-therapeutists — have also availed themselves of this mysterious entity, and by galvanization of the sympathetic have cured all manner of human ills, almost making, according to their own reports, the blind to

see, the deaf to hear, and the lame to leap as a hart. If, however, there be anything at all established by modern investigations, it is that the sympathetic nervous system is a human invention ; yet teachers and writers still continue to wrap themselves in the tattered rags of old opinions, physiological text-books drive more deeply the fastenings of error, by elaborate chapters on the subject, and even the greatest of all English prizes is offered in the year of our Lord, 1875, for an essay on the 'Diseases of the *Sympathetic* Nervous System.' Surely, then, our readers will pardon our occupying a brief space with the discussion of this old-world myth," etc.

The only valid excuse that can be made for this jaunty and highly figurative statement would depend on what is *meant* by the word "sympathetic," when it is used by well-informed writers. We will only speak for ourselves when we say that we do not clearly understand what the writer of the article believes to be the meaning others give to the term, and to which he so strongly objects. One thing is certain, we cannot use it in any such sense as our author appears to suppose.

We do not use it in any physiological sense at all, but simply to designate anatomically a certain portion of the nervous system, because, for this purpose, it is more generally understood than any other word.

We undertake to say that almost every physician, whether well-educated or not, understands the term to refer to the system of ganglia and related nerves, which lie chiefly outside of the cerebro-spinal cavity, and which, as a whole, is known to a far less number as partly comprising what is called the "vaso-motor" nervous system, and that no well-informed physician that can be found, entertains the idea that it is the peculiar agent or medium of the so-called, and, to a certain extent, properly called, "sympathies" of the body—as the writer in the *Times* would have us believe is so common at this day.

If the aim had been simply to object to the use of a term that, in its etymological or historical signification, is at variance with what must be, if correctly used, its real or present meaning, we would heartily agree with him, for it is greatly to be desired that the terms we employ in medicine, as elsewhere,

shall agree historically and actually in real and etymological import. The term is subject to criticism from this stand-point. But such was only in part the point of view of our author, and it is to the unwarrantable liberty he has taken of putting a meaning into the term for others, that they never dreamed in most cases, of putting into it for themselves, that we object in the paragraph quoted.

When a writer is so unsparing in his demands for verbal and scientific accuracy in others, we are naturally led to expect these qualities to predominate in his own utterances. And this brings us to the real point of the present article, viz.: to the accuracy of the writer's views in respect to the structure, functions, and relations of the "sympathetic" nervous system, and which we feel bound to question, almost from first to last.

To begin, we make the following quotation: "A nervous system must of course contain afferent nerves, running from the periphery to the centre which receives their transmitted impulses, and sends them back through other nerves to the periphery again. A nerve and a ganglion do not form in themselves a nervous system, else the posterior roots of the spinal nerve [s] and their ganglia are worthy of such dignity. Where then is the afferent nerve of the 'sympathetic nervous system?'"

The first sentence in this quotation is undoubtedly true, but the second one is not so. No one ought to know better than the writer of the article in the *Times*, that in the very lowest animals provided with a nervous system, the Ascidians for example, so far as can be anatomically demonstrated, that the nervous system consists of but little more than a ganglion with centripetal and centrifugal fibres, and yet it is very properly called a nervous system.

In higher animals it consists of a multiplication of similar ganglia, and however complex it may be, when it is subjected to anatomical analysis, it amounts to nothing more than this—ganglia that receive and give off fibres. How then can it be said that "a nerve and a ganglion do not form in themselves a nervous system"? But in point of fact, there is no such thing in the animal body as a ganglion and "*a nerve.*" The true statement is a ganglion and *nerves*. Every ganglion has,

no matter where it is situated, afferent and efferent nerve-fibres. Every complete nerve-*cell* gives off and receives a fibre, or what amounts to the same thing, which fibres either connect the cell with non-nervous parts, or with other nerve-cells. Every complete nerve-cell is a seat of nervous action, no matter where it is, whether in the spinal cord and brain or periphery of the body in the "vaso-motor nervous system". Either this or nothing. But the alternative in the last sentence of the above quotation is worthy of remark. If you admit that every ganglion and its *nerve* is a nervous system, you must admit "that the spinal nerve [s] and their ganglia are worthy of such dignity." We may very well admit this latter.

Surely the writer of this article could not have been acquainted with the structure of the ganglia on the posterior roots of the spinal nerves, or he would not have ventured the remark quoted. The nerve cells of these ganglia have no demonstrable connexion whatever with the fibres of the sensory root, amongst which they are found, and the perfect cells of the spinal ganglia have generally two fibres springing from them, the "direct" and the "spiral," both of which lead as a rule toward the periphery, and neither toward the cord; and hence such cells are to be regarded as capable of receiving impulses by one fibre, and sending them out by the other, which is all that can be said of any cell, whether in the cerebro-spinal axis or out of it. Moreover, we have a suspicion that these same ganglia on the posterior roots of the spinal nerves have special functions, and belong to a special nervous system. But if these things are so, what becomes of the statement we have quoted?

But again: "Where then is the afferent nerve of the 'sympathetic nervous system?' In the posterior spinal nerve roots and their continuations as the ordinary nerves of sensation, alone exist any nerve-fibres which are capable of transmitting a peripheral irritation so that it may reach the sympathetic ganglia. In other words, the afferent nerve of the so-called sympathetic system is a cerebro-spinal nerve, passing up into the medulla oblongata," etc.

This statement is not only partial, but it is erroneous. But we will not content ourselves with generalities.

It is erroneous to say, that "in the posterior nerve-roots and

their continuations as the ordinary nerves of sensation, alone exist any nerve-fibres which are capable of transmitting a peripheral irritation so that it may reach the sympathetic ganglia" It is true that impressions made on cerebro-spinal sensory nerves may be transmitted to the spinal cord, and at any height they may be reflected out through closely related spinal vaso-motor centres, along vaso-motor nerves, so as to affect the action of the sympathetic ganglia on the vessels. But this does not seem to be the opinion of the writer in the *Times*. He supposes it is necessary for all ingoing sensory impressions to be sent up to the medulla before they can be returned so as to affect the vascular system. The medulla is, no doubt, the seat of a chief vaso-motor centre; but it is an error to limit reflex vaso-motor centres to the medulla, as is done in the article in question, when it is probable they exist in the whole length of the cord.

But this is not all. It has been demonstrated that "sympathetic" fibres not only leave the cord to pass toward the periphery, but that through the *rami communicantes*, certain of the same kind of fibres pass toward, and probably enter, the cord, and they are *not* the "ordinary nerves of sensation," so far as can be told. What do these fibres go to the cord for? And then besides, not to speak of cerebro-spinal vaso-motor centres is it probable that all the ganglia of the sympathetic, and the thousands of ganglion cells, in such plexuses as those of Auerbach and of Meissner, not to mention those of the bladder, uterus, and in the walls of the small muscular vessels, etc., are only "reinforcing nerve masses, situated upon the tracks of efferent nerves, corresponding, it may be, to the posterior spinal ganglia on the afferent nerves?" We hardly care to discuss a question, the answer to which seems so plain. These ganglia and ganglion cells, do they not receive sensory or excitor, as well as give off, motory fibres?

We think it can be, and has been established, they do; and if this is so, what becomes of the statements quoted from the writer in the *Times?*

The ganglia of the "sympathetic" are just as truly nervous centres as the corpus striatum is, though subordinate in rank, and are just as truly the seats of reflex action. They may and

do receive impressions along afferent nerves, and these may be and are, reflected toward the periphery along efferent nerves, just as truly as they can be from the cord or medulla.

But these centres are connected by nerve-fibres with centres in the cord, or even the medulla, and why? That these higher centres may *excite* and *regulate* the action of the lower "sympathetic" centres, for example, by way of inhibition. These subordinate ganglia no more depend on the cord or medulla for their *power* to act, than a muscle does or a gland. The cord or medulla can simply *excite* or *arrest* action in the ganglia of the "sympathetic," and this is all. This is well seen in the case of the action of the extraneous nerves of the heart on its intrinsic ganglia.

Of course then, we do not agree to the unqualified statement that "the afferent nerve of the so-called sympathetic nervous system is a cerebro-spinal nerve passing up into the medulla oblongata."

Then again, what reason is there for thinking the "ganglia on the posterior roots of the spinal nerves" are simply "reinforcing masses," as is implied in selecting them as illustrations of this mode of viewing the peripheral ganglia of the "sympathetic" nervous system? Have we in reality any such thing, strictly speaking, in the nervous system, as a "reinforcing nerve mass?" And so on to the end of this remarkably loose and ill-digested article.

If not "for the sake of our foreign contemporaries," yet for that of our home readers, we hope the time will be long before we will see again so much that is erroneous in respect to an important subject, deliberately penned; especially in such apparent unconsciousness of threading a tissue of misconstrued relations.

In this issue we publish an account of the recent and first meeting of the American Neurological Association, from the pen of its accomplished secretary.

No public notice of the meeting had been given, and hence no members of the profession were present, except such as had a special interest in the cultivation of the department of medi-

cine to which the Association is devoted. As compared with the meetings of more comprehensive organizations, the number of members present was small, partly owing to the fact that, for various and mostly satisfactory reasons, several gentlemen were absent that it had been confidently expected would have been present.

Yet, as will be seen from a glance at the list of those who took an active part, the meeting was sufficiently large to demonstrate that what had been undertaken as an experiment, there was every reason to hope might be made a final success.

We think it cannot be doubted by any of those who were present at the meeting but that a number large enough, of good workers in the department of neurological medicine, exists in our own country to-day, to make it possible to form and maintain a society, the workings of which should form no insignificant part of the American contribution to the progress of scientific and practical medicine, and which may speedily vie with similar, older organizations abroad.

The number and character of the papers presented at the meeting, and the interesting and practical discussions had on them, was a matter of gratification to all, and though this was the initial meeting, we confidently look to the forthcoming volume of transactions to justify this feeling.

Almost the only thing that was open to criticism in the arrangements for the meeting, was that no provision had been made for an evening session. The period of working for each day was included between the hours of 2:30 and 6 p. m. This made the time for the reading of papers presented, and their adequate discussion, too short, and hence some of the more important were referred, without reading, to the Council.

There can be no doubt that in future this practical error will not be repeated. But any one who will glance at the record will see that an unusual amount of work was done to have been crowded into a period of time only equal to about *nine hours*. But much of the credit of getting the Association so soon to its appropriate work was due to the excellent manner in which all the preliminary arrangements had been made by the local committee at New York.

We sincerely hope that no lack of a spirit of true work, nor

any disposition to permit personal to outrank general interests in the society, may endanger the future success of the Association that has had such an auspicious beginning.

The field of medicine has become so broad that it is apparent on every hand that a division of labor, with the cultivation of special fields on the basis of a broad, sound knowledge of medicine in general, is demanded. And surely if any department is to be set in a measure by itself as a domain for special labor, there is not one that can present higher or more cogent reasons for this distinction, than that which embraces the nervous system. And we may add that there is not another, which on account of its breadth and its wide-spreading relations, has a better prospect of escaping that narrowness of view, or restricted range of sympathies, the manifestations of which, very properly constitute the vital objections to specialties, whether in medicine or out of it.

The *Chicago Medical Examiner* and the *Chicago Medical Journal*, after sixteen and thirty-two years respectively, of honorable and useful existence, have ceased to appear as independent publications, and have been consolidated. The new venture is to be called the *Chicago Medical Journal and Examiner*, and will be under the control of an association of gentlemen, including some of the best known and most honored names in the medical profession of the northwest. The firm of W. B. Keen, Cooke & Co., the publishers of the *Medical Journal*, will continue the publication of the new issue.

With the advantages of increased support and editorial coöperation, the new journal cannot, we think, fail to achieve success, and become one of the best medical periodicals in the country. The character of its managers is, indeed, a sufficient guarantee that this will be the case. It is to be the organ of no party or school, but will be, in all respects, independent and impartial; and it is, we understand, to aim to be a representative of truly scientific as well as practical medicine. We wish the new editors and managers the fullest success and support.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

Functions of the Brain.—L. Hermann (*Pflueger's Arch.*, X., p. 77) communicates the results of experiments on that subject, made in connexion with Drs. v. Borosnyai, Luchsinger, Steger and Pestalozzi. Doubting the correctness of Hitzig's explanation of his experiments, he localized the so-called centre on the surface of the cerebrum for the movements of the hind foot. On cauterizing this surface, or extirpating a piece to the depth of 1–1½ centimetre, or resorting to both procedures, he could still obtain the same movements of the extremity by applying the poles to the circumference of the cavity thus produced, without increasing the strength of the current. This proves conclusively that a diffusion of the current (Stromschleifen) reaches to below the cortex. He therefore maintains that Hitzig's results, correct as they are, do not warrant any conclusion on the function of the cerebral hemispheres. In his experiments, he noted the remarkable tolerance of the animals to this apparently severe operation. In two dogs surviving the experiments, all disturbances of motion and sensation succeeding the experiment had disappeared totally in the space of a fortnight, without regeneration of the portion destroyed. G.

The promised extended account of his investigations on the results of extirpation of the optic thalami, is given by Prof. Nothnagel in *Virchow's Archiv*, LXII., 1. The conclusions are summed up as follows:

a. Destruction of the optic thalami does not cause motor paralysis.

b. Just as little does it produce cutaneous anæsthesia.

And the experiments seem to support the view of Meynert, that in the optic thalami, motor processes are set in action that are excited by peripheral sensory impressions.

The subject of the functions of the brain was brought up in the Soc. de Biologie, April 3 (reported in *Gaz. Med. de Paris*), by M. Rouget, who reviewed a series of experiments undertaken by him for the purpose of testing the results obtained by Ferrier. He rejected the theory of diffusion of currents, proposed by Carville and Duret, and considered that the greater part of the results of the English author were well established.

M. Brown-Sequard remarked that in the observations of Ferrier there existed this peculiarity, that for the movements of one side of the head there were in various parts of the hemispheres five motor centres; for the anterior limbs there were only two, and the motor centre for the posterior members had long remained doubtful. There were two centres for the

orbicularis muscle of the eye, and only one for all the movements of a limb. He considered that the question of the excitability of the cortex ought to be taken up thoroughly. Some fifteen observations on the human subject seemed to indicate to him that limited lesions of the gray matter of the cortex produced certain special symptoms. He therefore thought that the society ought to take up the subject, and moved that a commission be appointed to perform the necessary experiments, etc., to decide the question.

The president, M. Ranvier, therefore, nominated as members of the commission proposed, MM. Brown-Sequard, Moreau, Vulpian, and Lepine.

The following note by M. Dupuy was read by the secretary, M. Henocque, at the *seance* of the Soc. de Biologie, April 17 (reported in *Gaz. Med. de Paris*):

1. If we lay bare the hemispheres in Guinea pigs, we never observe attacks of epileptiform convulsions, comparable to those which we see in animals, following various lesions of the nervous system.

2. An electric current, of any strength whatever, applied to these hemispheres also does not cause epileptiform convulsions in these animals, although it may produce the most violent opisthotonus.

3. The same is true of dogs and cats; the first, in particular, under the influence of intestinal worms, certain nervous lesions, and the intoxication by essence of absinthe, have convulsive epileptiform attacks, having no resemblance to opisthotonus nor to tetanic or choreic convulsions, or better, the universal muscular contractions provoked by electricity.

4. When we obtain localized movements in any group of muscles, from electric irritation of a given point of the cortical substance, I hold that these movements do not prove the excitability of the gray substance directly put in action by electricity. In a word, that substance is unexcitable. It may be, and I am inclined to think that it is so, that the electricity irritates and puts in action the nervous fibres in relation with the nerve cells, and which thus call out their action, but I do not believe that we can constantly designate any point whatever of the gray substance which, being thus called to action, can be considered as a motor centre. I propose to hereafter publish some experiments which support my views.

5. We cannot think that the most external white cortical layers are composed of excitable nervous fibres like those of the anterior columns of the cord, as M. Rouget has said, because the anterior columns, even when the animal is profoundly anæsthetized, irritated by the same current as the fibres of the cortex, give rise to muscular contractions, while the others under these conditions do not respond to this kind of irritation any more than to other physical and chemical means of irritation, which succeed with the anterior columns of the cord.

Arrest of the Heart.—M. Tarchanoff made a communication before the Soc. de Biologie, March 20 (reported in *Gaz. Med. de Paris*), in which, after alluding to the well-known experiment of Goltz, of causing a cessation of the heart's action by a smart tap on the abdomen, and those of Bernstein

of producing the same effect by electrizing the abdominal sympathetic, stated that he had also caused the arrest by merely touching the exposed and inflamed intestines after section of the abdominal walls. It was necessary that inflammation should have taken place, since the reaction did not follow touching the freshly exposed viscera. It likewise failed when the pneumogastrics were cut, and when the animal was curarized. The explanation given was in agreement with that of Bernstein, that the inflamed terminations of the sympathetic, being excited by the contact, the excitation was propagated along the communicating rami to the cord and upwards to the medulla, whence it reacted on the pneumogastrics.

At a later session of the same society, April 24, M. Tarchanoff made a second communication, in his own name and that of M. Prielma, the abstract of which we take from the *Gaz. des Hopitaux*, No. 49. The experiments were made by the authors on the arrest of the heart, provoked in animals by excitation of the pneumogastrics.

Wishing to obtain as prolonged an arrest as possible by means of this excitation, they observed the following fact, which seems to have heretofore escaped the attention of physiologists:

They wished to excite alternately each of the two pneumogastrics; but once when one of the two had ceased to be excitable, and consequently to exert action, the other, which had not yet been submitted to any excitation, also ceased to act, although it had not yet been touched. The excitation of only one pneumogastric, therefore, suffices to exhaust the moderator apparatus of the heart. It follows from this fact that the inhibitory mechanism is held in common by the two pneumogastrics. The fact is an important one as regards the inhibitory action of the pneumogastrics on the heart.

Reflex Effects of Cauterization.—At the meeting of the Soc. de Biologie, April 3 (reported in *Gaz. Med. de Paris*), M. Brown-Sequard related the results of experiments undertaken by him to determine the reflex action of cauterization of the skin at the level of the cervical vertebræ in man. Being struck by the fact that cauterization at this level produced favorable effects in cerebral congestions, M. Brown-Sequard concluded that the cauterization acted on the cerebral circulation by a reflex action on the great sympathetic; and then he sought to ascertain whether it did not produce the other effects of irritation of that nerve, such as pupillary dilatation and elevation of the temperature.

On three patients cauterized, the effects were quite noticeable; the pupils dilated, the dilatation lasting from five to fifteen minutes, and in one case there was an increase of temperature of one degree. M. Brown-Sequard, in testing whether some other impression, such as cold, produced analogous phenomena, did not obtain equally satisfactory results.

Structure of the Pacinian Corpuscles.—In a paper on the Pacinian corpuscles, just published in the *Quarterly Journal of Microscopical Sciences*, Dr. Schaefer states that a Pacinian corpuscle may be looked upon as consisting of three parts—the central fibre, the core, and the capsular enclosure.

The central fibre presents a distinct appearance of fibrillation, the fibrils, as a rule, crossing each other very obliquely. It is enlarged at the extremity in most cases, but occasionally there is no distinct swelling, the fibre being merely marked at its sides with minute denticulations or projections, from which, in preparations stained with chloride of gold, fine fibrils sometimes appear to proceed outward. The terminal enlargement, when present, is granular or homogeneous, and refracts light strongly, and it may contain a nucleus. The white substance of Schwann sometimes accompanies the central fibre for a short distance. No sheath of Schwann could be discovered in any instance covering the central fibre. In all respects the central fibre behaves like an axis cylinder. In regard to the core, in many, if not in all instances, an outer nucleated part of variable extent may be distinguished from the almost homogeneous non-nucleated substance which immediately surrounds the central fibre. Next, in reference to the capsular envelope, Dr. Schaefer's observations support the views of Axel Key and Retzius, who regarded the supposed simple capsules as consisting of two layers of flattened cells placed back to back. The intercapsular spaces are filled with an albuminous fluid, and are also pervaded by white and elastic fibres. In regard to the homology of the several parts of the Pacinian corpuscles with those of a nerve-fibre, Dr. Schaefer considers the central fibre as the axis cylinder. The main part of the core corresponds with the delicate protoplasmic layer which lies between the sheath of Schwann and the medullary sheath of a nerve-fibre, whilst the outermost portion of the core is distinctly continuous with the fine connective tissue in which the nerve-fibre lies imbedded within the neurilemma. The outer layers of the Pacinian body are continuous with the corresponding layers of the perineurium.—*London Lancet*, June.

Constitution of the Axis Cylinder.—Fleischl, *Beitr. z. Anat. u. Physiol. Festschr. C. Ludwig gewidmet* (abstracted in *Psych. Centralblatt*). The axis cylinder of the fishes' spinal cord appears differently, according to the fluid employed for hardening it. After hardening in chromic acid, bichrom. potassæ, or Mueller's fluid, we observe in cross sections, the well-known appearance of almost punctiform dark red ends of the axis cylinders with their surrounding concentric lamellæ of uncolored medullary substance; with a stronger power the axis cylinder commonly seems furnished with processes so that it presents a stellate, crescentic or other irregular outline. On longitudinal sections they appear as numerous sinuous extended cords of very unequal thickness, and furnished with excrescences of every conceivable form.

Preparations of the cord of fishes which have been merely hardened in alcohol present a very different appearance. In such the cross section shows the axis cylinders as broad, circular or rounded many-facetted polygonal surfaces of uniform rosy color; and in the longitudinal section they appear as similarly tinted regular stripes of considerable width.

If the cord is hardened by immersion from twenty-four to twenty-eight hours in a perosmic acid solution (1:1000), the cross section gives the same forms as when alcohol alone is employed; the medulla is colored black, the

axis cylinder, which may afterward be colored with carmine, is white. Hence it follows that the forms seen in the cord hardened by alcohol, correspond more closely with the normal than those seen after the use of chromic acid.

The conclusions which Fleischl deduces from his investigations are as follows:

The axis cylinder in life is a column of fluid, the volume of which is far more than half of that of the whole fibre.

The medullary matter occupies at most, in the living fibre, the space which after death is taken by the coagulated myeline.

The fluid which makes up the axis cylinder, contains a substance coagulating very readily and differently under different conditions.

Circulation of the Brain.—Dr. O. Heubner, in his recently published work, *Die Luetische Erkrankung der Hirnarterien*, gives some interesting details as to the distribution of the cerebral vessels. He operated by injecting the several arterial branches of the brain separately with colored fluids, and observing the results. The principal facts as to the final distribution of the larger vessels in the pia mater are thus summarized:

"The anterior cerebral artery supplies with its first branch of the second order, the network of the pia mater on the under surface of the first frontal convolution, the trigonum olfactorius, and the olfactory nerves; with its branches given off further on its course, it supplies those of the anterior and lateral surfaces of the first frontal convolution; with its corresponding half of the connecting commissure by the posterior branches, the superficies of the two central convolutions and the first parietal convolutions are supplied.

"The first branch of the second order of the middle cerebral artery supplies the third frontal convolution; the second supplies the second frontal convolution; the third the parts of the two central and superior parietal convolutions, which turn to the convexity of the brain; and the fourth supplies the second and third parietal, and part of the three temporal convolutions.

"The posterior cerebral artery supplies the occipital and part of the temporal convolutions.

"The island of Reil is nourished by an arterial network from the pia mater, which is chiefly derived from small lateral twigs of several branches of the arterial fossæ Sylvii.

"In the cerebellum, the regions of the pia mater supplied by single arterial branches, are not nearly so sharply defined as in the cerebrum."

The small arteries of the network of the pia mater, inosculate freely with each other, according to Heubner.

The arteries of the basal ganglia were also investigated in the same manner, with results not specially different from those of Duret, given in the January number of the Journal for the present year. Dr. Heubner distinguishes in the general circulation of the brain, two separate regions, the basal and the cortical, as described above. In the first region the arteries do not inosculate, but each has its own special tract; in the latter, the inosculations are free and numerous, as stated.

The Sensory Nerves of the Muscles.—Carl Sachs (*Reichert and Du-Bois Reymond's Archiv*, 1874, No. VI. p. 645–675), in a lengthy paper on this subject, offers the following general conclusions:

1. All objections that have been brought against the doctrine of the sensibility of the muscles, are easily overthrown on theoretic grounds.

2. Reflex contractions can be produced by irritation of the nerve trunk entering a muscle, or the muscle itself. This is evidence of the presence of sensory apparatus in the muscle.

3. The striped muscular fibre, even in an "enervated" state (by curare, analectrotonus, degeneration of the nerves), is still excitable by the induced electric current.

4. All motor nerve-fibres in the muscles of a frog's leg degenerate after section of the anterior roots of the sciatic nerve. A few fibres still remain intact, and degenerate after section of the posterior roots, although more slowly and less noticeably.

5. In the sartorius muscle, it is possible, by a peculiar cut, to show the separate action of the motor and sensory fibres. Irritation of the first causes local contractions; while of the latter, it is without effect.

6. With proper precautions, it is possible to irritate each nerve-fibre of a muscle by itself. We find fibres, irritation of which produces no contraction.

7. The intra-muscular fibres show, at tolerably regular intervals, the "annular strangulations" of Ranvier, the pre-existence of which was proved by their presence in fresh, physiologically active nerve-fibres.

8. The striped muscles of all vertebrates possess sensory fibres, which arise from a relatively small number of medullated fibres, by division. The secondary and tertiary branches, by their long isolated course, the ramificatory manner of their increase, are distinguished from the motor fibres which are always united in bundles and increase by division. They give out soft, non-medullated, nucleated fibrils, frequently anastomosing with each other, and terminating in infinitely fine branches: partly in the connective tissue envelopes of the muscles, partly in the interstitial tissue, and partly in the muscular fibre itself.

Function of the Semicircular Canals.—A. Bornhardt publishes in the *Cbl. f. d. Med. Wissensch.*, No. 21, the following conclusions of experiments carried on by himself in Prof. Cyon's laboratory in St. Petersburgh:

The principal object of a series of experiments on which I have long been engaged, was the solution of the question, whether the results of the division of the semicircular canals are to be considered as irritative or paralytic phenomena of the nervi vestibuli. It seems to me that a notable step in advance is afforded by my own observations, as follows:

1. I have experimentally demonstrated, that the motor phenomena following section of the canals, in the majority of cases, are due to the almost unavoidable accidents of the operation, and are not to be explained by any existing theory.

2. Experimental examination of the Breuer-Mach theory, shows its invalidity. If we take rabbits or doves after the semicircular canals have

been *carefully* divided, and fasten them on a wheel put in motion in a horizontal direction, we observe in these animals the same compensating motions of the head as are seen in others that are uninjured; i. e., in the animals operated upon as well as in those not so treated, the head always lags behind in the rotation, while when that ceases, it comes again to its normal position. Repetitions of the experiment always bring about the same result.

3. The movements of the head and eyes are also seen in animals operated upon, but weaker than in those that are still uninjured.

4. Certain anatomical data are opposed to Mach's view, and indicate that the contents of the canals are better suited for the conduction of undulations than of progressive movements.

5. Every muscular motion in moving the head must produce such undulations. I am, therefore, of the opinion, that the semicircular canals, through the conduction of the undulations caused by the muscular contraction, serve to produce the muscular sensation of activity in the muscles of the head.

6. The following experiment, often repeated by me, seems to support this view: If one lays bare the horizontal canal in a rabbit in such a way as not to injure its cartilaginous envelope, and then gently moves over it to and fro with the back of the knife so as to only shake up its contents, the same characteristic movements of the head and eyes take place as after its section.

7. That the direction of the muscles of the head is also (in doves) parallel to that of the canals, seems also to favor this view.

8. The same motor phenomena as after section of the canals have been produced by me by an operation, in which neither the brain nor the cartilaginous canals were involved. I applied to the vertical as well as the horizontal canals (of doves), the action of ether spray by means of an atomizer; or I simply touched a limited spot with a red hot needle, and in both cases the phenomena occurred. The same effect was produced by placing a vibrating tuning fork on the canal.

A more extended statement of the results of these investigations is promised.

The following are the titles of some of the recent papers in this department:

QUINCKE, On Excitation of the Vagus in Man, *Berliner Klin. Wochenschr.*, No. 15, April 12; CUNNINGHAM, Notes on the Great Splanchnic Ganglion, *Jour. of Anat. and Phys.*, May, 1875; WINTERNITZ, The Importance of the Functions of the Skin to the Bodily Temperature and the Heat Regulation, *Stricker's Jahrb.*, 1875, p. 1; BREUER, Contribution to our Knowledge of the Organs of the Static Sense (The Vestibular Apparatus of the Ear), *Ibid*, p. 87; NESTEROWSKY, The Nerves of the Liver, *Virchow's Archiv*, LXIII., 3 and 4, p. 363; JENDRASSIK, First Report on the Analysis of the Contraction Increase of the Striped Muscular Fibres, *Reichert and DuBois Reymond's Archiv*, 1873, No. 5, p. 513; FREY, The Vaso-motor Nerves of the Arm, *Ibid*, p. 633; DEGIOVANNI, Facts Concerning the Contractibility of the Capillary Blood-Vessels, *Rivista Clinica*, April; HERMANN MUNK, On Partial Excitation of the Nerves, *Reichert and DuBois Reymond's Archiv*, 1875, p. 41; BARUCHIN, The Electric Organs in the Malapterurus, *Centralbl. f. d. med. Wissensch.*, No. 1.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

Defective Corpus Callosum.—Dr. D. N. Knox, *Glasgow Med. Journal*, April, 1875, describes the case of an idiot woman, aged forty, in whom the corpus callosum was found wanting or represented only by a very slight ridge, scarcely perceptible anteriorly, but posteriorly about a tenth of an inch in depth. About half way from its beginning, above the lamina cinerea, it separated from the fornix and terminated at last in the lower part of the hippocampal convolution. The fornix was completely divided in the middle line. The septum lucidum was also defective, about one-half of it being present and represented by a lamina of white matter of considerable thickness, extending between the anterior part of the fornix and the corpus callosum ridge described above. The fifth ventricle was thus opened up into the general ventricular cavity. The anterior and posterior commissures of the third ventricle were present and well marked. The soft commissure could not be detected at the time of the examination.

The external convolutions of the hemispheres were numerous but rather small, and defective in various respects.

During life the patient exhibited a low type of idiocy, was unable to articulate, though able to walk she seldom did so, and she never recognized her attendants. Her head was of the usual size, but misshapen, the occiput being very flat and the forehead low.

Dr. Knox gives in his paper a review and analysis of the reported cases, some fourteen in number, of absent or defective corpus callosum, and ends with the following paragraph :

" The conclusions to which I have come, from a careful study of all the cases, are these : First, in those cases in which the commissure system is wholly wanting or very rudimentary, idiocy or imbecility prevails ; and second, in those in which the corpus callosum is only partially defective, while the other commissures are present, intelligence but slightly below the average, together with dullness or levity, melancholy, or perhaps childishness, are the usual mental characteristics."

The Median Occipital Fossa and the Vermis of the Cerebellum in the Insane.—Lombrosi and Bergonzoli, *Il Morgagni*, Nov., 1874 (abstracted by Obersteiner in *Psych. Centralbl.*), have examined the condition of a median occipital fossa (caused by division of the crista occipitalis), its presence or absence, in the skulls of the insane, also taking note of the condition of the cerebellum. In one hundred and eighty-one examinations they found this symmetrical 68 times, or 37.4 per cent.; unsymmetrical 16 times, or 8.6 per cent.; and wanting, 98 times, or 54 per cent. This abnormal cavity was most common in epileptics and monomaniacs (!), in whom also there was frequently hypertrophy of the vermis and of the almonds. Hypertrophy of the vermis was met with most frequently in epileptics and lunatics with erotic excitement.

In persons not insane these conditions were met in incomparably less proportions, and indeed most commonly in criminals. The authors conclude that they must coincide with the view of Otto, that the cerebellum may be a moderator of voluntary action.

INSANITY IN FRANCE.—The following figures are taken from the *Statistique de France*, a work recently published, by the Paris correspondent of the *British Med. Journal*, and appear in the number issued Jan. 23d.

"In 1861, the period from which proper vouchers or authentic information could be obtained, there were 22 lunatics to every 10,000 inhabitants of France; in 1866 there were 23.8, and in 1872, 24.37. Thus, in eleven years, the proportion of lunatics increased about two per 10,000 inhabitants. Indeed, there were times during this period when the whole population of France might have been considered insane, if one may judge by their acts. In 1871, when so many insane acts were committed in France, 49,589 lunatics of both sexes were admitted into the different asylums; of this number, 33,448 were affected with simple insanity; 6,450 with insanity complicated with epilepsy and paralysis; 4,577 with dementia, whether senile or organic; 5,114 with idiocy and cretinism. It will be seen from the above that simple insanity forms the largest proportion — about two-thirds of the total number of admissions; the cures are reckoned in the proportion of 6.4 per cent. These figures speak for themselves; they express not only depopulation but degradation."

To the above rather sensational statement, we would only add that the figures would be more significant if comparisons were given. It would be strange, indeed, if there was not an increase of insanity in France, considering all that country has passed through in the past few years, but it is more than probable that at least a slight, if not a proportional increase has likewise taken place in the same period in other countries, England and Germany for example. The proportion of cures, however, given in the above statement seems surprisingly small.

NERVOUS SYMPTOMS IN DIABETES.—Prof. Bouchardat, *Bull. Gen. de Therapeutique*, Feb. 28, gives a brief account of the principal disorders of innervation observed during the course of glycosuria. They are as follows:

1. *Partial Anæsthesia.*—This the author states is more frequent than is perhaps generally supposed; he has observed it in the lower limbs, the thorax and the face.

2. *Cramps*, which are among the most frequent nervous symptoms in severe cases. They occur oftener during the night, and are usually confined to the lower limbs. They disappear generally with improved regimen and exercise.

3. *Insomnia*, caused chiefly by the frequent necessity for micturition, and in great measure relieved when that necessity is removed. Exercise should be insisted on in the treatment of this condition, and an interval of some hours should intervene between supper and bedtime.

4. *Neuralgic pains* in the region of the kidneys are complained of by many patients; sometimes they are felt in the dorsal region, more rarely in

the lower limbs and articulations. Sometimes a feeling of numbness is complained of in the legs, of chills or burning heat of the extremities.

5. *Weakness of memory* is very frequent in diabetic patients past the meridian of life. This is not the usual senile weakness, but progresses much more rapidly, the ratio between them being as one to ten, and the faculties usually return with the disappearance of the other troublesome symptoms under treatment. There needs, however, to be a very cautious prognosis as to this point.

6. *Inability for mental labor* is usually observed in diabetic patients, and improvement in this occurs with improvement in the other symptoms. In many cases a recklessness and want of care is observed to an astonishing degree. An irresistible desire for sleep after meals is often observed.

7. *Irascibility* is frequent, especially in male patients, and it seems to have a tendency to increase the amount of sugar in urine.

8. *Melancholia and hypochondria.*—Cases of long standing, especially in males, are accompanied with low spirits and melancholy, a kind of low hypochondria; and this is observed more especially in males. This is due in part to the habit of idleness that the disease often produces, in part to the premature impotence of the patient, and lastly to the feeling of being afflicted with an incurable disease.

NERVOUS COMPLICATIONS IN PHTHISIS.—We extract the following from a notice by Dr. H. Huchard of a thesis by F. L. Hahn, Paris, 1874, in *L' Union Medicale*, February 9:

I. Passing in review the lesions that may be found in the brain, at the autopsies of phthisical patients, the author enumerates: Hyperæmia of the dura mater, pachymeningitis, simple or tuberculous meningitis, meningeal tuberculosis, and hydrocephalus. This last complication may be of inflammatory origin, dyscrasic, and mechanical. In this last case it is produced whenever the return circulation is obstructed, either by an obstacle within the brain, like tubercles of the brain, or meninges, or meningeal exudations, and bridles compressing and obliterating the veins of Galen or the sinuses, or again by an obstacle outside of the brain, such as thrombus of the jugular vein. Hydrocephalus may also be provoked by an obliteration of the venous sinuses of the dura mater, by sanguine coagulations or thromboses due to the alteration of the blood, or to the development of tubercular granulations in the walls of the vessels themselves. More frequently the brain is healthy, but, according to Lebert, anæmia is more common than hyperæmia. Cases of cerebral hæmorrhage have been cited that may be attributed to the formation of thromboses, and the consequent augmentation of tension in the capillaries, explained by the alteration of the blood in the vessels, and by the possibility of the formation of miliary aneurisms in consumptives, a fact observed by M. Liouville. Cerebral softening is due in most cases to a vascular obliteration. Finally, tubercles of the brain may be developed in the course of pulmonary phthisis.

II. The cord and its envelopes may present the following lesions: chronic inflammation of the meninges (Leudet), and intra-medullary tubercles. Cruveilhier has reported the case of a superficial pulmonary cavity

opening into the spinal canal (*Gaz. Hebdom.*, 1856). The brain and cord may be simultaneously attacked—thus cases of cerebro-spinal tuberculous meningitis have been observed (Senhouse, Kirkes, Liouville, Hayem, Langlet, etc.).

III. There have been observed in the course of phthisis, symptoms that must be attributed to an alteration of cranial or spinal nerves. A case of amaurosis, cited by Plumptree (*Med. Times and Gaz.*, 1855), due to a deposit of tuberculous matter around the optic nerves; alterations of the phrenic and pneumogastric nerves, described by J Heine, in 1827; lesions of the great sympathetic, observed in 1844 by Eichmann; intercostal neuritis observed by Beau, in 1849; some cases of tubercles in the nerves, and Bouchut has called attention to the optic-neuritis and perineuritis in cases of tuberculous tumors, or tuberculous meningitis of the base of the brain, the œdema and atrophy of the papilla; the retinal hæmorrhages, the tuberculous granulations of the retina, choroid, etc.

We can readily understand that the symptomatology of all these complications is most various and difficult. We may see also, besides the delirium that is often provoked by the fever or the profound cachectic condition of the patient, the true symptoms of mental alienation. Morel and Marcé have noticed a kind of melancholia not at all infrequent at the beginning of the disease. Toward its close, the delirium of consumptives, which ordinarily is mild and tranquil, may be altered to a furious delirium, or a veritable mania, of which Bergmann, Morel, Clouston, and Simon have published cases. All these cerebral symptoms may be attributed to the serious innutrition of the brain in the course of the consumptive disease, *par excellence.*

IV. In the last part of his work M. Hahn gives a chapter to "the nervous phenomena of still uncertain origin," among which he places: 1. The sensory disorders (facial, sciatic, and intercostal neuralgias; pains in the sternum, and at points on the spine; arthralgia; muscular pains; hyperæsthesia of the muscles and the skin; analgesia; anæsthesias, etc.). 2. Motor nervous disorders (tremor, contractions, phenomena of paresis and paralysis). 3. Vaso-motor troubles (reddening of the cheeks, cutaneous pigmentations, dilatation of the pupil of the affected side, elevation of temperature in the axilla of the side of the most diseased lung, the phenomenon of hippocratic finger, the *tache meningeale*, ecchymoses of the back of the hand, local asphyxias). Finally, certain cases of sudden death in consumption are attributed by Perroud to a reflex, the origin of which is the excitation starting from the pulmonary lesion, transmitted by the centripetal fibres of the vagus to the medulla, and causing a brusque arrest of the movements of the heart and those of respiration. As for ourselves, we deem that the explanation of these sudden deaths ought often to be sought elsewhere, and that the frequent profound alteration of the muscular fibres in such a cachectic disease cannot be left out in considering the causes of the fatal syncope sometimes observed.

Auditory Vertigo.—M. Bonnenfant, in his thesis on the semeiology of vertigo in affections of the ear (Paris, 1874), distinguishes in a pathogenetic point of view, several varieties of auditory vertigo: 1st, Vertigo by traumatic irritation; 2d, vertigo by galvanic excitation; 3d, labyrinthine vertigo, or that due to inflammatory lesions of the internal ear; 4th, vertigo

connected with diseases of the middle ear; 5th, that due to affections of the meatus; and 6th, and finally, the vertigo apparently due to reflex action. Without noticing all these varieties, we will give a little attention only to the vertigo due to galvanic excitation.

If we apply the two poles of the battery to the two mastoid processes, the subject of the experiment leans the head and body to one side as long as the current is passing, and on its interruption assumes again the erect position, as if controlled by an invisible hand. The vertigo disappears, but nausea and pain are complained of. The loss of equilibrium is always toward the positive pole.

When we place the magnetic pole on the neck, the trunk, or the limbs, and double the other conductor, so as to make two positive poles, and apply one of them to the mastoid process of one side, we produce an extreme vertigo with inclination of the body toward that side; but if we then apply the other positive electrode to the opposite mastoid process, every symptom of vertigo disappears. The vertigo seems, therefore, to be due to the difference of excitation of the nervous terminations of the two auditory apparatuses.—(*Gaz. Hebd.*) *Gaz. des Hopitaux*, Mar. 13.

Paralysis Agitans.—Dr. Henri Huchard describes (*L' Union Medicale*, Jan. 19) a case of paralysis agitans in a young girl, eighteen years of age, which was of fifteen years' standing, having first made its appearance when she was three years old. This disease has been generally considered as an affection of adult or middle age; the earliest age at which it had been previously reported was fourteen years. The cause in the case reported was absolutely unknown. The observation is unique, in that it gives the affection a place, exceptional, it is true, among the diseases of early childhood.

Aphasia.—Dr. G. DePoyen, of Monte, Guadeloupe, publishes in *L' Union Medicale* the case of a gentleman who, in a discussion, was taken with violent abdominal pains, and simultaneously lost completely the power of speech. The ability of expression was not lost, for he was able to communicate by writing. The case seems, therefore, to have been one of mechanical alalia, rather than of aphasia, properly so-called.

The treatment employed was palliative and anti-spasmodic, and the next day the patient had wholly recovered.

The explanation offered by Dr. DePoyen is that the violent enteralgia acted by some communication by means of the sympathetic with the medulla in affecting the executive organ of speech.

Migraine.—The following are the principal characters of true migraine as distinguished by Prof. Lasègue, and given in the *Gaz. des Hopitaux*, No. 36:

The first characteristic of migraine is, that it is a malady of attacks. Every continued cephalalgia, by this fact alone, is to be excluded.

A second characteristic is periodicity, irregular and undetermined, it is true, but still the attacks are never so close to each other as to suggest simple

remissions. M. Lasègue considers the weekly repetitions as the most typical. Without assigning any special limit as to frequency or infrequency, he is inclined to consider those as not true migraine that recur only once or twice a year.

The duration of the attack gives us more definite signs. It generally lasts twelve hours. Every hemicrania, lasting over forty-eight and less than six hours, he says is not a true migraine.

As to the attack itself, it is not difficult to describe; all its phenomena are subjective. He who has experienced them can alone give a clear idea. M. Lasègue having had this sorrowful privilege, and being able to give his account all the relief and coloring of a veritable picture, presents us with a lively description of the disorder. We extract from a notice of the work of Dr. Liveing, written by him for the *Archives Generales de Medicine*, in the year 1873.

The attack of migraine, says M. Lasègue, is like that of intermittent fever, a cycle of successive and regular phases. It is preceded by one of two orders of *malaise:* either a certain degree of physical and moral atony with diminution of the appetite, paleness of visage, and fatigued aspect, or an alacrity revealed by increased appetite, and a temporary intellectual exaltation. Migraine, thus preceded, does not ensue suddenly ; it needs nearly always the incubation of one night passed in heavy or more prolonged sleep than usual.

The classic migraine makes its appearance in the morning. The true disorder begins by sometimes a diffuse sense of cranial tension; sometimes by pain at a fixed point different from that of neuralgia. Whatever may be the first impression, the pain augments. Its principal points of intensity change from place to place, or rather undulate over the affected parts of head and face, invading more or less extensive surfaces, but never limiting themselves to particular nervous tracts.

Topographically, migraine is hemicranial, occipital, syncipital, or diffuse; in the first case it has its maximum of intensity in the orbit, on the superorbital and temporal regions, without even fixing itself below the suborbital line; elsewhere, there is felt a sensation of weight and fullness of the face, and a slight feeling as of the teeth on edge. The occipital form seems most painful, and is rarely unilateral ; the syncipital is never so.

Migraine is in rare cases generalized. Starting from one or many points, it extends over the whole cranial surface, without having everywhere an equal intensity. In this form, the patients complain that the head feels as if it had been scalped, or the skin seems on the other hand to adhere tightly to the bone ; they complain of being tortured by a leaden cap, an iron band, or a vice pressing on different limited points. The pain, however intolerable, is always more dull than lancinating, and is referred to the outside of the head.

By this we are able to distinguish from the severe headache that accompanies so many diseases. Persons subject to migraine, succeed very well, in cases complicated with headache, in separating the two elements.

M. Lasègue states that he has experienced the disorder during an attack of malarial fever, and the pain became most intense.

As the attack advances towards its acme, the sufferings ordinarily become

more confused, probably on account of the increased general *malaise*, or they change their place and redouble their intensity.

The brusque migration of the pain during a crisis is very common. This sudden change of locality, without premonition, is an essential element in the clinical history of migraine. Its like is not found in any other disorder of the nervous system.

Other discomforts add themselves to the pericranial sufferings, such as nausea, gastric pain, anorexia, and constipation. The disorders of the stomach are generally slight, and occur during the middle third of the attack, after which they moderate.

In the third period the violent pain is dulled, the nausea is less decided, but other still more inconvenient symptoms succeed these. The head beomes heavy and dull, the ocular pain is accented, but without any necessary troubles of vision. The first manifestations of a cerebral state exhibit themselves in intellectual torpor and a complete absence of ideas, or on the contrary, in a semi-delirium analogous to dreaming. The cerebral condition is nearly the same as in the beginning of sleep, which closes the attack. The cure is not complete until the patient has eaten.

Active Congestion.—The following is an abstract of a memoir by M. Onimus, as given in *La France Medicale*, No. 23:

In this work M. Onimus has sought to show, that beyond the congestions due to paralysis of the vaso-motor nerves, there are also active congestions arising on the other hand from the activity of the vaso-motor system.

An important experiment of M. Claude-Bernard has demonstrated that the excitation of sensory nerves causes a very manifest congestion ; thus the electrization of the chorda tympani produces an immediate augmentation of the salivary secretion, and a determination of blood to the gland. Many theories have been proposed to explain these phenomena. M. Schiff has admitted active dilator nerves; M. Brown-Sequard, a dilatation by attraction of blood to the tissues; Loven has proposed the theory of reflex paralysis, and it is this theory that M. Vulpian has adopted and developed in his last work, *Des Nerfs Vaso-Moteurs*, 1874.

M. Onimus, supporting himself on the researches of M. Ch. Legros, and on his own investigations made in collaboration with that lamented *savant*, seeks to show that the late experiments of Vulpian, far from proving that these active congestions are due to a reflex paralysis, appear rather to indicate that there is here an essentially vital and active phenomenon.

M. Onimus studies in succession the three following points :

1. The phenomena induced by excitation are not the same as those which cause the paralysis. The active congestions are not the result of a reflex paralysis.

2. The muscular fibres of the vessels serve to facilitate the course of the blood.

3. The active congestions are the result of increased functional activity of the muscular fibres of the vessels.

According to this theory, there are, so to speak, two kinds of contraction of the unstriped fibres of the vessels—the one tetanic, when the excitation is

violent, and which causes the diminution of their calibre, and the consequent pallor and slowing of the circulation; the other vermicular and progressive, acting like all the contractions of this kind, i. e., instead of arresting the progress of the contained substances in the muscular tube, it facilitates their progression as in the intestine.

The augmentation of the peripheral circulation instead of being as in the case of stimulants, a result of reflex paralysis, is caused on the other hand by an increased functional activity of the muscular fibres of the vascular walls.

Without entering into the physiological proofs with which M. Onimus supports his views, we hold that one of the best evidences in its favor is afforded by the anatomical fact that wherever in their tissues the cardiac action is unfelt or much diminished, the walls of the vessels are very rich in muscular fibres. This arrangement evidently indicates that the arterial contractility serves to help the blood along.

Finally, M. Onimus endeavors to show how the theory of reflex paralysis is in contradiction with pathological facts. There is, in fact, a great difference between active and paralytic congestions, in a clinical point of view, and in this relation the theory of autonomous contractions is of all modern physiological theories the one which coincides most nearly with the ideas of Senac and Bichat, who held that the peripheral vessels had an action independent of that of the heart, acting actively in the phenomena of circulation.

MUTTERING EPILEPSY.—Dr. W. B. Cheadle (*British Med. Jour.*, May 1), describes four cases of a peculiar epileptiform disease, characterized by an attack somewhat intermediate between the transient giddiness of *petit mal* and the fully developed seizure of the true epileptic fit, accompanied with muttering or rapid repetition of the same word or phrase a great number of times. He suggests for it the names eclampsia loquax or muttering epilepsy.

All the subjects observed by Dr. Cheadle were young, though some analogous cases reported by Trousseau occurred in adults. The occurrence of the repetition of the same word or phrase in each, seems to point, as the Doctor remarks, to a special irritative action on that part of the brain concerned in phonation; the coexistence of partial left hemiplegia in one case seemed to indicate a somewhat exceptional condition, as in some reported cases of left hemiplegia with aphasia.

Bromide of potassium caused complete disappearance of the symptoms in two cases, and mitigation of them in another. In the fourth case, an intercurrent affection interrupted the treatment, which at the time of writing had not yet been resumed.

MYELITIS.—We copy the following from a notice of a recent *brochure*, by Dr. E. Clement, in the *Union Medicale:*

Under the name of myelitis, of organic paraplegias, were confounded even very recently all the diseases characterized by lack of motor power which are not of cerebral origin. To-day clinical analysis, the practical

physiology has been able to introduce into this confusion some rational distinctions by which we can refer certain elementary lesions to their corresponding groups of symptoms.

Retaining the distinction of acute and chronic myelitis, we have, among the acute, the circumscribed and the generalized forms. There are also interstitial or diffuse, or rather parenchymatous. Circumscribed and interstitial, it includes two types, viz.: acute lumbo-dorsal myelitis and acute cervico-dorsal myelitis. Circumscribed and parenchymatous, the disease may be limited to the anterior horns, and it is then the atrophic paralysis of infancy, to which may be compared Duchenne's acute spinal paralysis of the adult, or it may occupy the medullary nuclei, forming the acute glosso-labio-laryngeal paralysis. Acute and generalized myelitis may be interstitial, giving rise to ascending spinal paralysis, limited to the gray matter it then constitutes traumatic tetanus (Michaud).

Chronic myelitis is still further subdivided: it may be parenchymatous or interstitial, according as it attacks, at least primarily, the tubular nerve element proper or the neuroglia. The parenchymatous form may be either primitive or secondary. When it attacks the white substance it takes the name of fasciculated sclerosis. And then, according as it seizes upon the different columns of the cord, it gives rise to various newly described morbid species. If the sclerosis occupies the external portions of the posterior columns, it is progressive locomotor ataxy; if it occupies the median portion of the same columns, it is the primary sclerosis of the pillars of Goll; it may be localized in the lateral columns—symmetrical sclerosis of the lateral columns; it may attack the lateral columns and the anterior horns—amyotrophic lateral sclerosis.

In the gray matter the primary parenchymatous chronic myelitis gives rise to progressive muscular atrophy or to glosso-labio-laryngeal paralysis, according as it occupies the anterior horns or the medullary nuclei.

The secondary chronic parenchymatous myelitis, when it results from compression, for example, causes, as regards alterations of the white substance in the posterior columns, and especially in the bundles of Goll, an ascending sclerosis, and in the lateral columns a descending sclerosis; and, as regards alterations of the gray matter, it produces muscular atrophy whenever the anterior horns are implicated in the lesion.

Chronic interstitial myelitis comes last, and it also may be either generalized or circumscribed. In the first category is multiple spinal sclerosis and that invasive continuous form which involves the cortical rings and the central peri-ependyma. As to the forms of circumscribed chronic interstitial myelitis, ordinarily consecutive to acute circumscribed myelitis, they also resemble the cervico-dorsal and lumbo-dorsal types of that form of the disease.

The reader who has had the patience to transcribe in his thought, or better still on paper, a synoptical table of these diverse morbid forms, will no doubt ask, taking note of the confusion caused by the lack of a well contrasted distinction of the forms, whether we have not here an excessive multiplicity of varieties of the disease. And, nevertheless, facts of great interest are developed by these researches, and Dr. Clement knows well how to show their value.

In locomotor ataxy, for example, it is well demonstrated that the primi-

tive lesion is a sclerosis starting within the external bundles of the posterior columns, propagating itself thence inwardly into the median bundles, and outwards toward the posterior horns; and while the acute lightning-like pains are dependent on the primitive lesion, the inco-ordination is only produced when the posterior roots are affected; finally, the appearance of parетic or paralytic symptoms reveals the the fact of the invasion of the posterior portions of the lateral columns, and if the lesion spreads as far as the anterior horns of gray matter, muscular atrophy is produced. The alteration of the lateral columns has, moreover, a typical symptom, that of muscular contraction. If the lesion is double, the contraction will occupy the two members symmetrically; it will affect the superior ones if the lesion is above the cervical enlargement. The lesion and the symptom are also in direct relation as regards extent, progress, and intensity.

* * * * * * * * * *

From the conclusions of this memoir, I extract the following:

The same lesion, located in anatomical elements of the same nature, and which should possess the same functions, produces sometimes paralysis, sometimes muscular atrophy, and sometimes both at once. This is still an obscure point, and not the least singular of those which yet remain to be explained in the symptomatology of the forms of myelitis.

TELEGRAPHERS' CRAMP.—M. Onimus (in *Gaz. Med. de Paris*).—Writers' cramp is the most common and well defined type of the affections that supervene in certain persons from the constant repetition of certain movements. A similar affection is met with in designers, engravers, and musicians, but we do not think it has been noticed heretofore among telegraph operators. We have recently had occasion to notice two cases, one of which is especially very characteristic, and presents many interesting peculiarities.

The patient, who is very intelligent, has been a telegraph operator nineteen years, has followed the progress of the disease since its first manifestations, and has observed that the first symptoms consist in difficulty in making dots, and particularly a succession of points. We know that in the Morse alphabet the letters are represented by a succession of traces and dots, and the first letters in making which difficulty was experienced, were the *s*, formed by three dots, the *i*, formed by two dots, and the *u*, of two points and a trace. The *d*, which begins with a line followed by two dots, was made better than the *u*, since the first motion in forming the line gave a greater assurance in the movement.

Gradually the formation of every kind of dot and line became impossible with the hand in the ordinary position, and the patient tried then to work the key with the thumb alone, and for nearly two years he was able to transmit dispatches in this way. After this period, the thumb was taken with cramps, and the patient tried successively the index and the middle fingers. With each of these he was able to work for two or three months, and both in turn took on the spasmodic action. At last he used the wrist, but the co-ordinated movements soon became impossible, and while the usage of the fingers produced a kind of stiffness, that of the wrist caused rapid and convulsive movements of the forearm whenever he attempted to send a dispatch. If he still

tried to overcome these difficulties of manipulation, he felt tinglings in the arm and even in the leg of the same side, a pain at the nucha, and sometimes a sensation of vertigo and insomnia. This affection is not very rare among telegraph employes, especially those who use the Morse system exclusively; they call it the *mal telegraphique.*

The best means of avoiding this affection is to change from time to time the sending apparatus, when the first symptoms of this complaint are experienced, to replace the Morse system by that of Hughes, and *vice versa*, since both are in use in the telegraph offices.

Syphilitic Nervous Disease.—The following aids for the diagnosis of the syphilitic nature of nervous affections, are given by Dr. J. Dreschfield, in the *Practitioner* for May :

1. Age of patient. The age of persons affected with syhilitic nervous disease ranges between 25 and 40 ; out of ninety-six cases collected by Braus, sixty were of patients between 20 and 40 years old, and the cases given by Broadbent, Buzzard, and others, exhibit the same proportions.

2. A syphilitic history. We have here to bear in mind that it is often difficult, especially in women, to trace such a history ; that often when the syphilitic virus selects for its locality the nervous system, there are few, if any, secondary symptoms ; while on the other hand, nervous troubles coming on in a syphilitic patient may be simply due to a coincidence. On looking over many recorded cases, I find that certain forms of syphilitic nervous disease are much oftener preceded by well marked secondary symptoms than others ; this, for instance, is true for syphilitic epilepsy and the more acute cases of meningitis, which come on soon after infection.

3. Multiplicity of lesion. Nervous symptoms which can only be accounted for by the assumption of separate pathological products, situated in different parts of the nervous system, are almost always due to syphilis.

4. Absence of other causes. This applies particularly to the paralysis of the different cranial nerves, and to sudden attacks of hemiplegia in young persons, in the absence of any cardiac or renal troubles.

5. Influence of anti-syphilitic treatment. In a great many cases, especially where the course of the nervous disease is acute, and where the patient has not previously undergone an anti-syphilitic treatment, the effects of the iodide and the mercury are very marked. In the more chronic cases, however, where the syphilitic deposit has itself undergone degenerative changes, and has established secondary changes in the surrounding nerve matter, the treatment will of necessity be of little avail.

Having diagnosed a nervous lesion to be syphilitic, it becomes then of some moment to determine the exact nature and seat of the affection. This, though important as regards the prognosis of the case, is of no great weight as regards the treatment. I hope, however, at a future period to refer to this point also.

Among others we may mention the following as having recently appeared on the pathology of the nervous system and mind:

Leidesdorf, On Epileptic Insanity, *Stricker's Jahrb.*, 1875, II., 157; Ober-

STEINER, On Certain Laws of Heredity, *Ibid*, 179; FRAENKEL, A Case of Multiple Cranial Nerve Paralysis, *Berliner Klin. Wochensch.*, No. 3, Jan. 18; BOUCHUT, On Spontaneous Hypnotism, *Gaz. des Hopitaux*, March 2 and 4; DROSDORFF, The Alterations of Sensibility in Articular Rheumatism and the Electro-therapy of that Disease, *Centralbl. f. d. Med. Wissensch.*, No. 17, April 3; SANDER, The Effect of Spinal Infantile Paralysis on the Motor Tracts of the Cerebral Cortex, *Ibid*, No. 15, March 27; FEREOL, Supplementary and Rectificatory Notes on a Case of Exophthalmic Goitre Complicated with Disorders of Sensibility and Motion, *L'Union Medicale*, April 22 and 24; BUCQUOY, On Zona, *La France Medicale*, April 21; J. MATHEWS DUNCAN, On Puerperal Eclampsia, *Practitioner*, April, 1875; SEMAL, On General Sensibility and its Alterations in Melancholic Affections, *Am. Med. Psych.*, May, 1875; P. FABRE, On Hysteria in the Male Sex, *Ibid;* HUREL, Observations on the History of Criminal Insanity, *Ibid;* CULLERRE, Alcoholism and Insanity with Ideas of Persecution, *Ibid;* HAWDEN, Case of Atrophy of Right Hemisphere of Cerebrum and Left Side of Cerebellum, with Atrophy of Left Side of Body, *Jour. Anat. and Phys.*, May, 1874; CUNNINGHAM, Lateral Curvature of Spine, with Hypertrophy of Sympathetic Nervous System in the Lumbar and Sacral Regions, *Ibid;* HEINZEL, On the Diagnostic Value of the Ophthalmoscopic Appearances in the Intra-cranial Disorders of Children, *Jahrb. f. Kinderheilk.*, VIII., 3, p. 331; HEITLER, Studies on the Alterations in the Lungs Following Injuries of the Brain, *Stricker's Jahrb.*, 1875, p. 59; PRZEWOSKI, Œdematous Swelling of the Pacinian Corpuscles, *Virchow's Archiv*, LXIII., 3 and 4, p. 363; POPOFF, On Alterations in the Brain in Abdominal Typhus and in Traumatic Inflammations, *Ibid*, p. 421; IMMANUEL MUNK, Involuntary *Manège* Movements as a Symptom of Basilar Meningitis, with Critical Contributions of our Knowledge of Impulsive Movements, *Ibid*, p. 518; WILLIGK, Bulbar Paralysis caused by Embolism of the Basilar Artery, *Prager Vierteljahrschr.*, 1875, II., p. 39; ZURADELLI, On Contractions and Paralysis of the External Vasomotors and their Cure by means of Electricity, *Il Galvani* (cont. art.); NICOLSON, The Morbid Psychology of Criminals, *Jour. of Mental Science*, April; SHEARER, Notes in Regard to the Prevalence of Insanity and other Nervous Diseases in China, *Ibid;* DEAS, An Illustration of Social Differences in the Distribution of Insanity, *Ibid;* ELISCHER, On the Alterations of the Brain in Chorea Minor, *Virchow's Archiv*, LXIII., 1 and 2, p. 104; ARNDT, On the Pathological Anatomy of the Central Nervous System, *Ibid*, p. 241; PETERSSON, Cases of Neoformations in the Brain, with Remarks on the Diagnosis of Intra-cranial Tumors, *Upsala Läkareforenings Forhandlinger*, X., 285.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

Mental Influence.—At the April meeting of the New York Neurological Society, Dr. Geo. M. Beard, in the course of the discussion of the paper of Dr. Leroy Satterlee, upon "neuroses of the skin," said that he had been endeavoring to treat various nervous affections by the power of the mind alone. He is trying to reduce this method of treating diseases to a certain scientific basis, and just now is beginning to treat skin diseases in that manner.

For example, in the case of eczema, he takes a piece of metal and applies it over the diseased spot, and thus endeavors to make the patient believe that he is putting magnetism in him and influencing the disease by it. Then he asks him how long he can wait for the disease to be cured. "Two weeks?" "Yes." And in two weeks he will be cured. The practice, he states, has worked admirably with other diseases, and he thought good results would follow this method of procedure in some diseases of the skin, for it is a well-known fact that skin affections are frequently caused by mental influences. The same influence could be used in the course of the same affections. He mentioned a case reported in the newspapers shortly after the great Chicago fire, of a person having eczema being cured by the excitement of that occasion, yet statements of medical matters made through the daily papers should be taken with due allowance. He mentioned several cases which showed the influence of the mind upon diseases of the skin. He recollected the case of a gentleman living in a distant city where the influence of the mind was particularly well shown: He had an obstinate eczema of the scrotum. His position in business was a responsible one, and the disease seemed to rise and fall with the degree of anxiety in business. There seemed to be an intimate correlation between the two.

Regarding the treatment of skin diseases by electricity, he said that when electricity is applied locally, and relief or cure is obtained, it does not follow that the disease is reached through the nerves. It may be that the relief takes place through the chemical action of the current, or at least by its direct local effect on the tissues, just as happens in the treatment of ulcers. But when the applications were made centrally in the method of central galvanization, and no applications were made to the diseased surface, and relief followed, it was a strong fact in favor of the theory of the nervous origin of these diseases. This interesting fact was shown in the case of eczema and prurigo.

Then there are some temperaments which will not bear electricity. They may have skin disease. And if such diseases in such persons are treated by electricity they will not be cured. He had seen a patient, with Dr. Bulkley, suffering from herpes, followed by neuralgia, treated with electricity, with unsatisfactory result. The failure, however, was not with the disease, but with the patient—with his temperament. The same disease in other patients is relieved at once by the use of electricity. In a similar case in another patient, seen also with Dr. Bulkley, the treatment was successful. W.

PHYSIOLOGICAL EFFECTS OF AMMONIA.—O. Funke and A. Deahna, *Pflueger's Arch. f. d. ges. Phys.*, IX., s. 416. In frogs the authors noticed, on administration of ammonia in any way whatsoever, the occurrence of tetanic convulsions, following the primary manifestations of pain, after a time proportionate to the concentration of the article. This spasm, which the authors consider reflex in its nature, is soon followed by utter prostration, accompanied, however, by a state of *exalted* reflex irritability, so that the slightest sensory impression, even loud shouting, is responded to, though feebly, by reflex movements. Still a repetition of the tetanus was never observed, probably from the great exhaustion. In other more severe cases, which pursue a fatal course, reflex irritability is entirely destroyed by the primary tetanus, while motor nerves and muscles still respond to a direct stimulus. Rabbits react in a similar manner on injection of the agent into the blood; the hypodermic method was found of much less effect in them.

The tetanus is of centric origin, as it implicates the posterior extremities even after their blood supply is cut off, while they escape the convulsions on section of the sciatic nerves. Division of the cord below the medulla does not affect the result. The reflex impulses are so powerful as to overcome even the paralysis induced by moderate doses of curare. In short, the agent appears to be identical in its action on the cord with strychnia.

The effects of ammonia on the circulation are a feeble reduction of the blood-pressure, followed in a short time by an enormous increase of the same, while from the beginning the frequency of the pulse is diminished. Both the latter and the primary diminution of pressure were found to be the result of a strong excitation of the vagus of centric origin, though it could not be determined whether this was due to stimulation of that centre, or merely increase of its reflex irritability. The secondary augmentation of tension is caused by powerful contraction of the systemic arterioles, from excitation mainly of the vaso-motor centre in the medulla, though it was not proven conclusively that the stimulation was limited to this centre alone. The dyspnœa produced by the agent is indicated by a primary acceleration of respiration, which, at first shallow, hereupon becomes deeper. Larger doses produce a subsequent *arrest* for two to three seconds, which is sometimes the only respiratory alteration. If now tetanus occurs, respiration is more or less arrested during the entire period. Hereupon an augmentation, both in frequency and depth of respiration, follows, all of which phenomena are rendered more prominent by section of the vagi. This latter fact would therefore prove that the arrest of respiration is not due merely to an irritation of the peripheral end of the vagus by the agent, which Knoll had previously shown to occur.

H. G.

NITRITE OF AMYL.—W. Filehne, *Pflueger's Arch. f. d. ges. Phys.*, IX., s. 470. In order to avoid the fright of the animals (rabbits), as well as any impression of the vapor on the trigeminus-terminations in the nasal mucous membrane, inducing reflex phenomena, the author caused the animals to inhale through a canula in the divided trachea. The question whether the dilatation of vessels caused by nitrite of amyl is due to an influence of the

agent on the musculature of the vessels, Filehne tried to solve by observing the pulmonary vessels, after laying bare the transparent pleura, which he found were not altered in calibre. On severing one sympathetic in the neck, and including the same in an induced current of such an intensity that the vascularity in the corresponding ear did not perceptibly differ from that of the other side, inhalation of the vapor caused hyperæmia only on the normal side. The legitimate deductions from this experiment are that nitrite of amyl paralyzes neither the vessels themselves, nor their nerves, but causes hyperæmia by destroying the tonus of the vaso-motor nerves. This need not be referred necessarily to paralysis of the vaso-motor centres, but may be explained on the theory of reflex inhibition. Section, however, of the *depressor* nerves (Ludwig) does not alter the result.

The heart of the frog was found to become paralyzed by the drug, while, on the contrary, the rabbit's pulse was much accelerated. The latter was counted by introducing into the heart an acupuncture-needle, armed at its free end with a pellet of sealing wax, which, at every systole, struck against a glass tumbler. After every tenth stroke, as counted by the ear, a chalk-mark was made, thus enabling the observer to record even a very frequent beat. The acceleration of the pulse is due to destruction of the tonus of the pneumogastric nerves (which, being not maintained in the frog, accounts for the want of acceleration in that animal). In conclusion, the author refers to the analogy, first pointed out by Darwin, between the effects of nitrite of amyl on animals, and the result of some psychical processes in man, manifested by blushing of certain parts of the body, and an increase in the frequency of the pulse, maintaining that blushing, etc., is not a privilege of man alone, though in animals, on account of inferior mental development, a psychical impulse is wanting, while its place can be supplied by the agent in question. H. G.

The reaction of nerves to the galvanic current, according to whether the circuit is closed by the cathode or anode, has been studied by H. Engesser (*Pflueger's Arch.*, X., p. 147), since Hitzig asserted he had found a greater sensitiveness to the anode in his experiments on the excitability of the hemispheres. Engesser, however, could not detect any difference in effect in the peripheral nerves, either exposed in the frog or undisturbed in man. H. G.

Nitrite of Amyl in Tetanus.—Dr. Wm. S. Forbes read before the College of Physicians of Philadelphia, April 7th (reported in *Med. Times*), the history of a case of acute traumatic tetanus, beginning the fourth day after an extensive burn, which was treated and completely cured in forty-six days by inhalations of nitrite of amyl. Forty hours after the onset of the disease, the temperature was 102, the pulse 133, and the respiration 32, with marked opisthotonus and trismus, considerable involvement of the muscles of nutrition, and painful spasmodic paroxysms. The administration of the nitrite was commenced on the evening of the sixth day after the accident, and when the patient was in the condition above described. The sole treat-

ment consisted in the inhalation of five drops of nitrite of amyl twice daily until the cure was complete.

Commenting on this case, Dr. Forbes offers the following as his theory of the pathology of the disease He says: "We learn that tetanus is the result of an augmented disintegration of muscular tissue; that the products of this disintegration, lactic acid and kreatine, further excite the nervous peripheries until, by reflex action, there is established a violent and painful contraction of the voluntary muscles, which is long-continued and heretofore uncontrollable; that in traumatic tetanus the augmented disintegration of muscular tissue is caused by an increased excitation of the nerve peripheries exposed; that in idiopathic tetanus there is a self-generated power akin to the poison of rabies and to strychnia, exciting the nerve peripheries, which, by reflex action, causes the augmented disintegration of muscular tissue, and the products of disintegration, lactic acid and kreatine, which further excite the nerve peripheries until there is established the condition known as tetanus.

"Impressed with this as the pathology of tetanus, the appropriate treatment should be the use of those agents which are known to prevent the disintegration of tissues, which will lessen the irritated nerve peripheries, which will sustain nutrition and advance the elimination of the morbid products.

"The *modus operandi* of the nitrite appears to be by arresting the process of oxidation in the tissue, and the same reasons which lead to its use in tetanus—namely, to prevent the disintegration of tissue, and to lessen the irritated nerve peripheries while nature is eliminating the morbid products—should also cause it to be employed in hydrophobia."

Eserine in Chorea.—Bouchut, in an extended paper in the *Bull. Gen. de Therapeutique*, goes over the whole subject of the therapeutic action of eserine, with special reference to its employment in chorea in children. He gives in brief the results of treatment by this agent, of twenty-four cases of this disease, and sums up as follows:

En resumé, after four hundred and thirty-seven observations of eserism produced in children by moderate doses, we observe that eserine acts on the muscular contractility, which it decreases, and on the contractility of the small vessels, which it augments.

Eserine, or sulphate of eserine, may be administered by hypodermic injections, or by the stomach, and it ought to be given fasting.

Under the form of subcutaneous injections, eserine or its sulphate may be injected in doses of from three to five milligrammes; for, from the symptoms, I think it ought not to be given in greater quantity.

By injection, the action is very energetic, and the dose should not be half as large as when given by the stomach.

The action of eserine lasts from one to two or three hours, and then is entirely exhausted, permitting thus the dose to be renewed, so that in three or four during the day, fifteen or twenty milligrammes may be used.

Eserine given to children, produces its effects in a few minutes, but more quickly when given by injections, than when administered by the mouth.

In doses of from three to five milligrammes, the effects of eserine are constant; I have only seen three children in whom they failed,

Usually, eserine causes paleness, with narrowing of the pulse, sometimes followed by retardation.

Nearly all the children treated with eserine, have suffered from *malaise;* have complained loudly of epigastric distress, with gastralgia, nausea, and expectoration of watery, glutinous matter.

Eserine sometimes causes bilious vomiting.

It does not alter the bodily temperature.

It has in no case, in the doses I have indicated, produced either colic or diarrhœa.

Given internally, eserine leaves the pupil in its normal condition of contractility; it is only exceptionally otherwise.

Eserine often causes a rather marked perspiration of the face and body.

Paresis of the diaphragm, and even its temporary paralysis, are the most serious and painful symptoms observed after the injection of five milligrammes of eserine.

When the drug has exhausted its action, the children take on their usual condition; there seem to be no after effects.

Eserine is not found in the urine after the employment of the small doses I have indicated.

Administered in cases of chorea, eserine arrests the choreic movements during the time of its action, and gradually moderates them in the interval, in such a manner as to cure the disease in an average period, which I have estimated to be ten days.

The effects of the eserine in chorea, are more certain when given hypodermically, than when given by the mouth.

I have never seen eserine produce tremor or convulsions, and it is probable that these accidents can only be caused by massive and toxic doses.

Rest in Tetanus.—Dr. Renzi (*Gazetta Medica Italia Prov. di Ven.*) finds that, both in animals and human beings attacked by tetanus, light renders the tetanic contractions more frequent and more intense. It may, likewise, be experimentally demonstrated on animals, that absolute rest and the absence of every cause of excitement render tetanus less violent and less fatal. Of three cases of acute tetanus in which complete rest alone was employed, two were cured. The patients were placed in a perfectly dark and isolated room; every noise and excitement was avoided; and the patients were only visited at long intervals to give them drink. In the fatal case, hydrate of chloral had been administered in the form of injection, and seemed to still further impede the respiration, already affected by the progress of the disease (*British Med. Journal*, May 29).

Alcohol.—A. Schmidt (*Centralblatt f. d. Med. Wissensch.*, No. 23) gives an account of a series of ten experiments performed by him in the laboratory of Prof. Binz, of Bonn, as to the elimination of alcohol by the lungs. The

tests used were the vaporimeter of Muspratt, and the reagents, bichromate of potash and iodoform. The results seemed to show that only a mere trace of the alcohol ingested could be detected in the respiration.

At the session of the Soc. de Biologie, April 24 (reported in *Gaz. des Hopitaux*), M. Wisstraten communicated the results he had obtained in making injections of alcohol in frogs. If a small quantity is injected, we obtain a powerful contraction of the arteries, lasting from fifty minutes to two hours. The veins dilate, at first show a momentary dilatation which is soon replaced by a contraction which lasts a longer time than that of the arteries. The heart-beats sensibly diminish. At the beginning of the experiment, the animal executes instinctive movements, but there soon follows a complete anæsthesia, during which only spasmodic motions are produced. The reflex movements are abolished, then the sensibility gradually returns as the action of the alcohol becomes exhausted.

Antagonism of Jaborandi and Atropia.—Prof. Vulpian, experimenting on these remedies, discovered the following facts (reported in *Gaz. des Hopitaux*, No. 47):

1. That it was sufficient to inject a certain quantity (about sixty grains) of a solution of jaborandi into the crural vein of a dog, to cause a considerable increase in the salivary and biliary secretions, which on the other hand were completely suppressed if the administration of the jaborandi was followed by a like injection of sulphate of atropia.

2. That jaborandi placed directly on the heart or injected under the skin of a frog, produced a considerable slowing, and even a complete arrest of that organ, while it again took on its activity and normal frequency under the influence of atropia. The same experiment repeated on the dog gave similar results.

3. Finally, the extract of jaborandi causes a myosis nearly as considerable as that from calabar bean; and here again, sulphate of atropia easily overcomes the effects produced by the first named drug.

Cerebroscopy.—At one of his last Tuesday clinics at the Hospital des Enfants Malades, M. Bouchut called together a number of his Paris confreres, and with them one professor of Montpellier, to demonstrate before them, in a special conference, the results of his labors in medical ophthalmoscopy and cerebroscopy or encephaloscopy.

He first sketched the anatomical and physiological relations of the eye with the brain or spinal cord, and next he explained the influence of cerebro-spinal lesions on the optic nerve, the retina, and the choroid.

He next indicated the laws of the formation of intra-ocular lesions depending on disease of the brain, cord and meninges.

These laws are four in number:

1. Whenever the cranial circulation is interrupted, either in the sinuses and meningeal veins by compression of the ventricles distended with serous fluid, or by any other cause, an arrest of the venous circulation takes place which produces in the eye swelling, hyperæmia, and œdema of the papilla, varicosity of the veins, and sometimes hæmorrhages.

2. When a tumor with encephalitis, or when a partial encephalitis exists, then follows a descending phlegmasia, which causes a sclerosis of the optic nerve, and exudation that constrict the papilla, and finally cause its atrophy.

3. If the cord is affected by an anterior or posterior sclerosis, since by reason of its relations with the sympathetic, the spinal cord acts on the eye, there results a papillary hyperæmia, which in time causes atrophy. This is what we see in locomotor ataxy.

4. Finally, in all the diatheses and infections, when the whole system suffers, the eye also is affected, and we have certain forms of neuritis and choroiditis.

After this preamble, M. Bouchut, by means of his luminous projection, showed mural pictures of all the ocular lesions produced by cerebro-spinal diseases. There were exhibited spinal neuritis, and those due to locomotor-ataxia, neuritis, and neuro-retinitis produced by tuberculous, typhoid or rheumatismal meningitis—by cerebral hæmorrhage or softening, by hydrocephalus or thromboses of the sinuses of the dura mater—by chronic encephalitis, and by the encephalitis resulting from cardiac disease—by cerebral tumors—by tuberculosis—by syphilis—by albuminuria—by leukæmia, etc.; and finally, the neuritis resulting from paralysis of the sixth pair, those following certain epilepsies, hallucinations, contusions of the head, etc.—*La France Medicale*, March 27.

Chloral.—G. Leonardi (*La Nuova Liguria Med.*, XXI., 1874) abstracted in *Allg. Med. Central-Zeitung*, offers the following general conclusions in regard to this drug :

1. Beneficent as is this agent, it cannot be denied that it is sometimes misemployed. More than 2,200 pounds are annually used in the city of London.

2. The unfavorable results from the use of the remedy, so far observed, are not to be laid to its account, but to the indiscretion of physicians who, without regarding the physiological, therapeutic, and toxic action of the drug, employ it indiscriminately in the most diverse affections.

3. The contradictory opinions among physicians as to the drug, are due to the fact that the researches and observations so far made are insufficient; we do not yet possess any certain information as to its indications and contra-indications.

4. Chloral hydrate acts first as an excitant and second as an anæsthetizing agent, acting as such particularly on the cerebral centres. Its action is rapid and constant, depending on the more or less good composition of the preparation used, and on the idiosyncrasy of the patient.

5. It can be administered either by the mouth or anus, and preferably in teaspoonful dose of the solution in syrup, or dissolved in water for injection into the rectum.

6. The administration of chloral as a hypnotic is advisable in all cases where the beneficial influence of sound sleep is needed. It is contra-indicated in cases of cardiac weakness with valvular deficiency, whenever there is disorganization of the mucous membrane of the digestive organs, and also in advanced disease of the organs of respiration.

7. The average dose ranges between two and five grammes (=30 grs.—75

grs.). More than eight grammes should never be given, since in above that quantity it becomes a deadly poison.

8. A valuable and essential remedial agent in the hands of the understanding physician, it may become a dangerous poison in those of inexperienced and superficial persons.

Treatment of Hypertrophies and Atrophies.—The following are the conclusions of a memoir by M. Dally (*Gaz. Hebd.*) *La France Medicale*, March 20 :

1. It is important in practice to distinguish first of all the trophic disorders, and especially the hypertrophies which depend upon a primitive acute or chronic alteration of the nervous centres, and those which have their point of departure from a direct and primary lesion of the peripheral organs.

2. The first are generally incurable ; but they can usually be much diminished when their locality is primarily cerebral, or when they take on an acute course in the cord that can be modified at a period near its beginning.

3. The hypertrophies of peripheral origin, traumatic, rheumatismal, professional, anæmic, are, on the contrary, usually curable.

4. In the treatment of hypertrophies, the physical agents, caloric manipulations and electricity, may be used with success whenever they reach the primitive lesions. They act in creating local conditions favorable to nutrition, and not in artificially provoking the spinal nerves governing the circulation and secretions. This latter action, if it really takes place, is soon exhausted and unfruitful.

5. Chemical agents seem to have no other action than that of favorably modifying the digestion.

6. The biological agents, such as exercise and gymnastics, cause, when they are effective, functional activities, the conflict of the innervation and the proper function of the elements which seem necessary or at least favorable to trophic processes.

7. The systematic and combined employment of these different agents gives to the physician a powerful influence on the direction of the nutritive functions.

Strychnia and Curare.—At the session of the Soc. de Biologie, Feb. 20 (reported in *Gaz. des Hopitaux*), M. Dupuy stated that he had performed some experiments on frogs that demonstrated anew that strychnia and curare did not produce the effects on the nervous system of these animals that had been claimed by MM. Martin-Magron and Bouisson.

1. A frog, to which a large dose of strychnine has been administered, is taken with violent tetanic convulsions, and then falls into a state of complete resolution. If now we irritate the posterior limbs, we do not excite muscular contractions, but if we expose the sciatic nerve, and irritate it directly, we call forth contractions in the muscles supplied by it.

2. If we apply a ligature on the lumbar region of a frog, so as to isolate the whole posterior part of the body, and then give large doses of strychnia, the tetanic convulsions and subsequent relaxation take place. If now, at

this moment, we expose and irritate the sciatic nerve, we produce contraction in the limb supplied by that nerve.

3. If we expose and sever the sciatic nerve very high up, in a frog, protecting it by paper wrapped around its peripheral extremity, and then administer a large dose of strychnia, and after the periods of tetanization and relaxation, we irritate the exposed peripheral end of the sciatic, we always produce muscular contractions in the limb it supplies.

M. Dupuy concluded from these experiments that chlorate of strychnia did not act like curare in paralyzing the terminal ends of the motor nerves, but rather that the cord, on account of the violent contractions of which it is the point of departure, loses its excitability and becomes unable to propagate to the muscles the force to make them contract,

In the discussion of this communication, M. Claude Bernard stated that the only character which permitted us to make an absolute distinction, was as follows : If we ligature the posterior part of the body, so as to isolate it completely from the rest, except by the nerves, and then administer curare, we never obtain convulsions in this posterior part, and the sensibility is preserved ; and if, in the same conditions, we administer strychnia, the convulsions take place, and when they are over there is no trace of sensibility. The action of curare is, therefore, the reverse of that of strychnia. Strychnia acts first on the sensory nerves, then on the motor ; curare, on the other hand, first acts on the motor and then afterwards on the sensory nerves.

Influence of Electrization on the Trophic Disorders following Section of the Sciatic Nerve.—M. Dejerine read before the Soc. de Biologie, March 13 (reported in *Gaz. Med. de Paris*), a note relative to some experiments lately performed by him in the laboratory of Prof. Vulpian, in regard to the influence of the faradic current on the trophic troubles following section of the sciatic nerve in Guinea pigs. He divided the two nerves in two separate animals, and then submitted one posterior limb of each to electrization for five minutes each day. The results are summed up as follows :

"*En resumé* the faradic currents appeared to us, in this experiment, to act in moderating very clearly the trophic disorders observed in the members of an animal after section of the sciatics. In fact, in one of our Guinea pigs they were not developed at all, and in the other they were much less marked and later in their appearance.

"As to the influence of the faradic currents on the muscular fibre in this experiment, it seemed to be in retarding the muscular atrophy, and the diminution of electro-contractility."

Arsenic.—Eustace Smith, M. D., *Brit. Med. Journal*, May 1, recommends the use in chorea of Fowler's solution, in doses of ten minims, three times a day, immediately after meals. He says, "the influence of this treatment upon the disorder is seen almost immediately, and it is rare for any of the physiological effects of the drug to be observed. By this means, cases of the disease which had resisted smaller doses of arsenic, may be cured in a few days, and even severe cases seldom last longer than a fortnight or three weeks."

THEBAIN.—J. Ott (*Boston Med. and Surg. Jour.*, April 8) offers the following summary of the results of his investigations on the physiological action of thebain:

1. Thebain is a tetanoid agent, and pigeons have no special immunity against it.
2. The tetanus is not cerebral, but spinal in origin.
3. The motor and sensory nerves, and the striated muscles are not affected by it.
4. It increases the pulse and blood-pressure, by an action on the vaso-motor centre and the heart itself.
5. The reflex action of the depressor nerve is in no way interfered with.

ELECTRICITY IN HEMICRANIA.—Domenico Severi.—The author, in the month of September, 1874, inserted in the journal *Galvani*, a note in which he considered hemicrania as a temporary paralysis of the cervical sympathetic. He admitted, however, that hemicranias of a different nature existed. We have now another observation by the same author. A man of forty years was subject to frequent attacks of hemicrania on the left side. It was preceded by heat and swelling of the veins of the side; recurred every month or oftener, when it was induced by any intellectual labor.

Severi proposed the application of electricity to the cervical sympathetic, and applied the induction machine of Pizzorno, taking care to apply one electrode along the whole course of the sympathetic in the neck. The application was kept up ten minutes. All the existing symptoms, heat, venous turgescence, etc., disappeared.

At the end of the month a new attack came on. Electricity was not applied, but it was observed that the intensity and duration of the seizure was less than before. When it again appeared, electrization was again resorted to, with success in averting the attack. The author hence concludes that electricity is always indicated in hemicrania, and that it is frequently a good palliative and curative agent.

TRANSFUSION OF BLOOD IN INSANITY.—We copy the following abstract by Leidesdorff, of four articles on this subject which appeared in the *Archivio Italieno*, January and March, 1875, from the *Psych. Centralbl.*, No. 3, of the present year:

The four simultaneously appearing articles in the *Italian Archiv for Nervous and Mental Disease*, show sufficiently to what an extent the Italian physicians have taken up the subject of transfusion.

Michetti gives a series of comparative experiments performed by him, on transfusion of human and animal blood. They consist of six operations, in three of which, arterial lamb's blood, and in the three others, defibrinated human blood was employed. From 20–25 grammes (= from about ℥ to ℥ oz.) were injected. The special form of the disease was melancholia of a severe type. Two ended fatally in about three days; one from profound inanition and exhaustion, and the other from exhaustion and diarrhœa. In the other four cases, a more or less enduring improvement followed the operation.

Michetti comes to the conclusion, that transfusion, if undertaken with sufficient care and foresight, is not only harmless, but is preferable to other means for reviving the depressed activity of the nervous system; and that mediate transfusion with defibrinated human blood, is less to be recommended than the immediate transfusion with lamb's blood.

Michetti does not seem to have attempted the operation with human blood from vein to vein.

Dr. Ponza narrates three cases of transfusion with arterial lamb's blood. The first was a melancholic pellagrous subject, who had been suffering for some months from diarrhœa. After the completion of the operation, and on the same day, the patient left his bed, ate with appetite, and his diarrhœa ceased.

The second case was an individual suffering from delusions of persecutions and suicidal in his tendencies. The third was a case of melancholia, with pain and ideas of persecution, and the patient had bitten off a piece of his tongue.

Before the operation in all three cases, a corresponding quantity of blood was abstracted by means of leeches. Case No. 1, in spite of the improvement already manifested, was subjected to a second transfusion nine days after the first, and perfectly recovered. The second patient was also similarly operated upon some eight weeks after the first transfusion, but without previous application of leeches, and a notable improvement in his condition was produced. Finally, the third patient was also a second time treated by transfusion, and his conduct and manner were tranquilized as the result.

In none of the three cases were any unpleasant symptoms observed; in all, a slight chill occurred, followed by increase of the temperature and pulse. Bloody stools or urine occurred in no case.

Ponza concludes from his experiments :

1. That direct transfusion with arterial lamb's blood, apart from the value of the method in cases of dangerous hæmorrhage, is established as a veritable restorative means in pellagrous insanity, and must be considered as an easy and comparatively painless operation.

2. That transfusion is also proved to be a useful diffuse irritant agency in stupid melancholia.

Bergonzi is an opponent of transfusion. The improvement produced in cases of melancholia with stupor, he explains by the pain of the operation, and the psychic impression from the whole manipulation. He admits that transfusion may save life in cases of hæmorrhage in persons otherwise sound; but holds that in anæmia caused by advanced organic disease, it cannot be beneficial, and while admitting it to be an important means of excitation, he shows its dangers from congestive conditions, from rupture of blood-vessels, and from thrombi, and holds that it is unpermissible to endanger life, in order to restore the mental faculties. He does not, however, support his opinions with any facts of observation or experiments.

Livi, after a short historical sketch of transfusion, and an explanation of methods, narrates two cases of his own observation, both of long standing atonic melancholia. For three days previously to the operation, the pulse and temperature were carefully noted, the urine analyzed, and the ophthalmoscopic appearances observed. Arterial lamb's blood was transfused in

both cases, and the operation was repeated in the first, five, and again in fourteen days afterwards, and in the second, twenty-four days after the first operation; in both there was an apparent immediate improvement, but no cure. (This was also the case in a similar treatment of a case of stupid melancholia by Leidesdorff, where the patient, immediately after the operation, broke his silence of a week's duration, and otherwise changed from his former condition). In no case have uncomfortable symptoms been the result of transfusion.

MONOBROMIDE OF CAMPHOR.—At the *seance* of the Soc. de Therap., Jan. 27 (reported in *Bull. Gen. de Therap.*), M. Trasbot, Professor at Alfort, reported that he had experimented with the bromide of camphor on animals, and obtained results disagreeing with those reported by M. Bourneville.

He first administered bromide of camphor in dogs suffering from epilepsy and chorea, and obtained no relief in the nervous symptoms; the dose at first ten centigrammes (= 1.5 grains) was raised to fifty centigrammes, and even to one gramme (= 15 grains) in the dog. In another series of experiments instituted to study the action of the drug, he never observed the least somnolence or the slightest lowering of the pulse or temperature. This medicine always produced, on the other hand, in doses of fifty centigrammes to one gramme, well marked symptoms of excitement, and true convulsive attacks, altogether comparable to those produced by strychnia, so that, from his experiments, bromide of camphor should be considered as a tetanizing poison.

M. Dujardin-Beaumetz reported that he had given the drug many times, but his testimony was not strongly in favor of its value. In hysteria, the results were uncertain; in epilepsy they were completely *nul.* In affections of the genito-urinary organs, spermatorrhœa, for example, it acted more as a camphorated preparation than as a bromide.

CROTON CHLORAL.—The following are some of the conclusions of a paper by Dr. Weill (*Thèse de Paris*, abstracted in *Bull. Gen. de Thérap.*) on this agent:

1. Its physiological action is different from that of chloral.

2. It is hypnotic in the same way, and generally in smaller quantity than the other drug.

3. It exercises a special action on the sensory cranial nerves.

4. In moderate doses, it has no effect on the pulsations of the heart, and on the muscular tonicity, and it does not slow the respiration and lower the temperature as much as chloral.

5. In extreme doses, it destroys life by arresting the respiration.

6. The lesions found at the autopsy of animals killed by it, consist in an intense hyperæmia of the meninges, especially those of the encephalon.

7. Its therapeutical employment is indicated:

a. In neuralgias of the trigeminus;

b. In other neuralgias, and to relieve pain in general;

c. In spasmodic affections of the nervous system;

d. To quiet cough in certain chronic affections of the respiratory organs;

e. To procure sleep.

8. The contra-indications to its employment, are an inflammatory state of the digestive organs, and a predisposition to cerebral congestions.

9. Its taste is more disagreeable than that of chloral, and needs to be masked by a corrective. The extract of liquorice seems best for this purpose.

10. It cannot be given hypodermically.

11. The dose should vary according to the age, the particular susceptibility of each person, and the effects desired. Dr. Weill says: "If we wish only to procure sleep, we can begin with from seven to fifteen grains, and in the great majority of cases this will be sufficient; at least when the pains are not such as to make large doses of a narcotic absolutely indispensable. In such cases, we may administer at once, thirty, forty-five, or even sixty grains.

"In the neuralgias or other nervous affections, the practice of the English physicians is especially applicable: one, one and a half, or three grains repeated every quarter of an hour, every half hour, or every hour, until relief is obtained; and we are often astonished at the rapidity with which it comes."

Damiana.—Dr. J. J. Caldwell (*Va. Medical Monthly*, May) calls attention to a new remedy, a Mexican plant called damiana (the botanical name is not given), which seems to have, according to his testimony, a very powerful stimulant effect on the uro-genital apparatus, in both sexes. He gives four cases of complete or partial impotence and irritability, which readily yielded to the effects of the drug. He employs the tincture and fluid extract.

It would seem that there is something worthy of investigation in the alleged virtues of this plant.

Picrotoxine and Chloral Hydrate.—The following are the general conclusions of a series of investigations on the physiological action of picrotoxine, the active principle of cocculus Indicus, by Dr. J. Crichton Browne, and published in several numbers of the *British Medical Journal*, the concluding article appearing May 24th:

1. Chloral hydrate is physiologically antagonistic to picrotoxine, in rabbits and Guinea pigs; and will, when administered in a suitable and proportionate dose, save life after a fatal dose of picrotoxine.

2. The antagonism of chloral hydrate to picrotoxine in rabbits and Guinea pigs, may be exerted so as to save life, even when it is not administered until fifteen or twenty minutes after the fatal dose of picrotoxine.

3. The antagonism of chloral hydrate to picrotoxine is subject to two limitations: *a*, That the dose of picrotoxine may be so large as to kill before the chloral hydrate has time to operate; *b*, That the dose of picrotoxine may be so large that nothing short of a poisonous dose of chloral hydrate would avail to counteract it.

4. Picrotoxine is to a very limited extent antagonistic to chloral hydrate, in rabbits and Guinea pigs, by mitigating the hypnotic effects of the latter upon the brain and higher nervous centres, which it stimulates to activity.

5. The minimum fatal dose of chloral hydrate in the rabbit, is twelve grains to each pound of body weight.

6. Practically, no antagonism exists between picrotoxine and chloral hydrate in the cat, nor between strychnia and chloral hydrate.

7. Picrotoxine and chloral hydrate, when administered simultaneously to the cat, cause death by stopping the action of the heart, and not by any destructive or exhaustive action upon the supreme nervous centres.

8. Chloral hydrate causes in the cat excitement and restlessness, with motor defects prior to the state of sopor, and its effects upon that animal are protracted to an extraordinary extent.

9. The energy of the action of chloral hydrate, as measured by its minimum fatal dose, is in proportion to the development of the cerebral hemispheres.

We add also the following titles of recent papers in this department:

Von Mering, On the Physiological and Therapeutic Action of Croton Chloral Hydrate, *Berliner Klin. Wochenschr.*, No. 21, May 24; also Researches on the Action of Chloral Hydrate and Croton Chloral Hydrate, *Arch. f. Exper. Pathol. u. Pharmakol.*, III., 3 and 4, 1875; Riegel, The Therapeutic Employment of Jaborandi, *Berliner Klin. Wochenschr.* No. 7, Feb. 15; Carpenter, On the Rational Treatment of some forms of Hemiplegia, *Practitioner*, May, 321; Turner, On the Relief of Toothache, *Ibid*, 332; Dyce Duckworth, On the Relief of Toothache by Bicarbonate of Soda, *Ibid*, April; Lawson, On the Monobromide of Camphor, *Ibid;* Schwalbe, Electro-therapeutic Report, *Virchow's Archiv*, LXIII., 3 and 4, p. 462; Fr. Jolly, On the Family care of the Insane in Scotland, *Jour. of Mental Science*, April; Tebaldi, Nitrite of Amyl, its Action and Uses in Medicine, particularly in Mental Disorders; *Revista Sperimentale di Freniatria*, Fasc III., p. 177; Taylor, Gelseminum Sempervirens—An Inquiry into its Physiological Action, etc., *Richm. and Louisv. Med. Jour.*, June, 1875.

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Medicinische Central-Zeitung.
Allgemeine Zeitschrift fuer Psychiatrie und Psychisch. Gerichtl. Medicin.
Annales Médico-Pyschologiques.
Archiv fuer Anatomie, Physiologie, und Wissenschaftl. Medicin.
Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.
Archiv fuer die Gesammte Physiologie der Menschen und Thiere.
Archiv fuer Psychiatrie.
Archivio Italiano, per le Malattie Nervosi.
Archivio di Medicina, Chirurgia ed Igiene.
Berliner Klinische Wochenschrift.
British Medical Journal.
Bulletin Generale de Thérapeutique.
Bulletino delle Scienze Mediche, Bologna.
Centralblatt f. d. Med. Wissenschaften.
Gazetta Frenocomia di Reggio.
Gazette Médicale de Paris.
Gazette Médicale de Bordeaux.
Gazette des Hopitaux.
Hygiea.
Hospitals Tidende.
Il Galvani.
Jahrbuch f. Kinderheilkunde u. Physische Erziehung.
Jahresbericht u. d. Leistungen u. Fortschritte in der Gesammt. Medicin.
Journal of Anatomy and Physiology.
Journal de l'Anatomie et de Physiologie, etc.
Journal de Medicine et de Chirurgie Pratiques.
Journal of Mental Science.
La France Médicale.
Lancet.
Le Progrès Médical.
Lo Sperimentale.
L'Union Médicale.
Medicinische Jahrbuecher.
Nordiskt Medicinskt Arkiv.
Norsk Magazin for Lagensvidenselskabens.
Pharmaceutical Journal and Transactions.
Psychiatrisches Centralblatt.
Public Health Magazine.
Rivista Clinica di Bologna.
Revista Sperimentale di Freniatria e de Medicina Legale.
Revue de Thérapeutique.

Revue des Sciences Médicales.
Revue Scientifique.
Schmidt's Jahrbuecher der In- und Auslandischen Gesammten Medicin.
The Practitioner.
Upsala Lakareforenings Forehandlinger.
Vierteljahreschrift fuer die Prakt. Heilkunde.
Wiener Klinik.
Wiener Medicinische Press.
Zeitschrift f. Biologie.

The following domestic exchanges have been received:

American Journal of Insanity.
American Journal of Medical Sciences.
American Journal of Obstetrics.
American Journal of Pharmacy.
American Medical Weekly.
American Naturalist.
American Practitioner.
Atlanta Medical and Surgical Journal.
Boston Medical and Surgical Journal.
Canada Medical Record.
Chicago Medical Journal.
Clinic.
Cincinnati Lancet and Observer.
Detroit Review of Medicine and Pharmacy.
Indiana Journal of Medicine.
Medical Examiner.
Medical Herald.
Medical News and Library.
Medical Record.
Medical Register and Advertiser.
Medical and Surgical Reporter.
Nashville Journal of Medicine.
New York Medical Journal.
Peninsular Journal of Medicine.
Pacific Medical and Surgical Journal.
Pharmacist.
Philadelphia Medical Times.
Physician and Surgeon.
Physician and Pharmacist.
Psychological and Medico-Legal Journal.
Richmond and Louisville Medical Journal.
Sanitarian.
St. Louis Medical and Surgical Journal.
Virginia Medical Monthly.

BOOKS, ETC., RECEIVED.

NOTE.—The foreign works in this list may be obtained through Messrs. B. Westermann & Co., No. 524 Broadway, New York.

Beitraege zur Anatomie und Physiologie, als Festgabe Carl Ludwig zum 15 October gewidmet von seinen Schuelern. Erstes Heft. 4to mit 30 Holzschnitten und Tafeln. I.–IX. Zweites Heft. "Ueber die Stammesentwickelung des Sehorgans der Wirbelthiere," von Wilhelm Mueller. Mit Tafeln. X.–XV. Leipzig: 1875.

Das Verhaeltniss der Nerven zu der Harnhautkoerperchen. Von Dr. Leopold Koenigstein. (Aus den Phys. Institute der Wiener Universitaet.) (Vorgelegt in der Sitzung am 18 Marz, 1875.)

Ueber die verschiedene Erregbarkeit functionell verschiedener nervmuskelapparate. Von Alexander Rollett. II. Abtheilung. (Mit 1 Tafel.) (Aus dem LXXI. Bande der Sitzb. der k. Akad. der Wissensch. III. Abth. Febr. Heft, Jahrg. 1875.)

Lecons sur l'Appareil Vaso-Moteur (Physiologie et Pathologie) faites ala Facultè de Medicine de Paris, par M. le Professeur A. Vulpian. Redigees et publiees par M. A. Dr. Carville. Tome II. Paris: 1875. 8vo. 726 pp.

On Paralysis from Brain Disease in its Common Forms. By H. Charlton Bastian, M.A., M.D., F.R.S., etc. London: Macmillan & Co., 1875. 340 pp., 8vo.

La Paralyse du Nerf Sympathetique Cervical. Étude Clinique par William Nicati, Ancien Interne de Clinique Ophthalmologique. Dissertation inaugurale présentee à la Faculté de Medicine de Zurich. Lausanne and Paris: 1873. 83 pp., 8vo.

Gheel, eine Reisestudie, oder Colonie und Asyl. Beitrage zur Geschicht der practischen Psychiatrie. Von J. Rüedy. Bonn: 1874. 86 pp.

On the Physiology of General Paralysis of the Insane, and of Epilepsy. By George Thompson, L.R.C.P., London, Medical Superintendent of the Bristol Lunatic Asylum. (Reprinted from *Journal of Mental Science*, January and April, 1875.) 16 pp.

The Borderlands of Insanity, and other allied papers. By Andrew Wynter, M.D., M.R.C.P., London. (Being essays from the *Quarterly* and *Edinburg Reviews*.) London: 1875, 314 pp., 8vo.

Family Thermometry ; a Manual of Thermometry, for Mothers, Nurses, Hospitalers, etc., and all who have charge of the sick and of the young. By Edward Seguin, M.D. New York: 1873. 72 pp.

Medical Addresses. By Benjamin Eddy Cotting, A.M., M.D., Harv. 123 pp.

Thirty-Second Annual Report of the Managers of the State Lunatic Asylum, Utica, N. Y., for the year 1874. Transmitted to the Legislature January 15, 1875. Albany: 1875. 74 pp.

Miami Medical College of Cincinnati. Sixteenth Annual Announcement. Session of 1875–1876.

Address delivered before the American Academy of Dental Science, at their Seventh Annual Meeting, held in Boston, September 28, 1874. By Dr. W. W. Allport of Chicago. Published by the Academy. 16 pp.

Problems of Life and Mind. By George Henry Lewes. First Series. The Foundations of a Creed. Vol. I., 1874, 434 pp. Vol. II., 1875, 487 pp.

Nouveau Dictionnaire de Medicine et de Chirurgie Pratique. Tome Vingtieme. Lacr-Lux. Paris : 1875. 802 pp.

A Series of American Clinical Lectures. Edited by E. C. Seguin, M.D. Vol. I., 1875. G. P. Putnam's Sons, New York.
No. I.—On Disease of the Hip Joint. By Lewis A. Sayre, M.D. 24 pp.
No. II.—Acute Rheumatism in Infancy and Childhood. By A. Jacobi, M.D. 37 pp.
No. III.—Pneumo-Thorax. By Austin Flint, Sr., M.D. 19 pp.
No. IV.—Rest in the Treatment of Nervous Diseases. By S. Weir Mitchell, M.D. 20 pp.

First Annual Report of the Secretary of the State Board of Health of the State of Michigan for the fiscal year ending September 30, 1873. Lansing : 1874. 101 pp.

Fifth Annual Report of the Secretary of State of the State of Michigan, relating to the Registry and Return of Births, Marriages, and Deaths, for the year 1871. By authority. Lansing : 1874. 376 pp.

Analysis of One Thousand Cases of Skin Disease, with Cases and Remarks on Treatment. By L. Duncan Bulkley, A.M., M.D. (Reprinted from the *American Practitioner* for May, 1875.) 29 pp.

Reports of the Trustees and Superintendent of the Butler Hospital for the Insane. Presented to the Corporation at their Annual Meeting, January 27, 1875.

Twelfth Annual Report of the New York Society for the Relief of the Ruptured and Crippled. May, 1875.

On the Homœopathicity of Electricity. By R. N. Tooker, A.M., M.D. (Reprint from the *United States Medical Investigator* [Homœopathic] 1875.)

State of Missouri vs. Benjamin F. Cronenbold. Murder in the First Degree. By C. H. Hughes, M.D., St. Louis. (From the *American Journal of Insanity* for April, 1875.)

The Model Physician and Model Patient. Addresses delivered by H. D. Didama, M.D., Prof. of Prin. and Pract. of Medicine, Syracuse University.

A Clinical Contribution to the Treatment of Tubal Pregnancy. By T. Gaillard Thomas, M.D. (Reprinted from the *New York Medical Journal*, June, 1875.)

Fourteenth Annual Report of the Cincinnati Hospital to the Mayor of Cincinnati for the year ending December 31, 1874. H. M. Jones, Superintendent.

Circular No. 8. War Department, Surgeon-General's Office, Washington, May 1, 1875. A Report on the Hygiene of the United States Army, with Descriptions of Military Posts. Washington: 1875. 567 pp. 4to.

Annual Announcement of the Woman's Hospital Medical College of Chicago, Ill. Session of 1875–6.

Resumè of a Report on Position, Pneumatic Pressure and Mechanical Appliance in Uterine Displacements. Read before the Georgia Medical Association at Savannah, April 23, 1875, by Henry Frazer Campbell, A.M., M.D. (Extract from the June number of the *Atlanta Med. and Surg. Journal.*)

THE

CHICAGO JOURNAL

OF

Nervous and Mental Disease.

Vol. II. OCTOBER, 1875. No. 4.

Original Articles, Selections and Translations.

*Art. I.—ON THE EXISTENCE OF DEFINITE MOTOR CENTRES IN THE CEREBRAL CORTEX.

Need of critical discussion of experimental methods and results –Structure of the cerebral cortex—Cells—Fibres—Functions of the cortex—Motor functions—Motor centres—Fritsch and Hitzig, Ferrier, etc.—Two kinds of experiments—Mutilating or destructive (Gudden, Nothnagel, Fournié, Dupuy, Carville and Duret, Brown-Sequard, etc.)—Excitation experiments (Hitzig, Ferrier. etc.)—Modes of proceeding of these last—Their conclusions—Position of certain centres—Objections to the doctrine of definite motor centres in the cortex of the brain—List of principal objections of Dupuy, Carville and Duret, Flint, Brown-Sequard, and others—Discussion of objections—Gray matter of cortex inexcitable—Fibres excitable—Brown-Sequard's objections—Their value—They do not seem to overthrow the general doctrine of the existence of definite motor cortical centres—Recent experiments of Ferrier, etc.

MR. PRESIDENT AND GENTLEMEN: The subject which I purpose calling to your notice this evening is one which is now attracting a very considerable degree of attention among the best experimental physiologists the world over. And it is a subject having not only a high scientific but also a practical interest for us all. I do not propose to bring before you any new experiments. They are needed, and will be made. My aim will be to try and interpret, if I can, some of the results arrived at recently by experimental inves-

* Read at the meeting of September 13th of the Society of Physicians and Surgeons of Chicago.

tigation, and which have proved thus far, to an unusual degree, discordant. Many excellent physiologists have either recently held or do now hold to the opinion that separate motor centres exist in the gray matter of the cortex of the brain, while others, equally competent in every respect, hold to the opinion that they do not exist, or that their existence is doubtful. A great many experiments have been performed, and others are being performed, but the question, though fairly under discussion, appears to be remote from a final settlement, though it is to be hoped that the competent committee recently appointed by the French Academy of Sciences will be able to reach some definite conclusions, based throughout on critical experimental investigation. But while we are awaiting the termination or fruits of such labors, it has seemed to me that some of the conflicting questions that are now alive might be done away with by a careful analysis of their conditions and relations, in the light of established anatomical and physiological principles, as regards the nervous system. There is something to be done by a critical discussion of experimental methods and results, more, it seems to me than many are willing to admit. And I may as well express an opinion I have often expressed elsewhere, that we do not now so much need new experiments in many departments of physiology as we do patient, critical reflection on those we now have. Whether in the present case this need exists may be made apparent in the later progress of this paper. But, without further preliminary, I will pass at once to my subject.

The cortex of the brain, as you are probably all aware, consists, especially in man, of a rather thick layer of gray nervous matter, spread like a cap over the entire upper surface of the hemispheres, indeed everywhere over their surface, except a comparatively small space at the base of the brain, where it is absent, to admit of certain masses of nerve fibres passing in and out of the interior of the brain, and which fibres serve partly to connect the cells of the inner surface of the cortex with the masses of gray nervous matter of the medulla and spinal axis below it.

The superficial area of this great cap of nervous matter is much increased by being thrown into numerous folds,

both longitudinal and transverse, which, if it could be blown out like a bladder or a balloon, and the folds thus obliterated, would occupy a much larger space than that afforded by the cavity of the cranium. When carefully examined this cap of gray nervous matter is seen to consist of numerous layers, varying from three to seven, with intervening white layers, the latter consisting mostly of fine white fibres, passing in various directions, and to be referred to shortly. The gray layers consist, as you know, of all but innumerable cells, of angular, pyramidal and other forms, very small and variable in size, and connected together in a remarkable manner by means of fine fibres and fine branching processes from cell to cell. These cells differ not only in form and size in the different layers, but in different parts of the brain in corresponding layers. Their probable total number is something immense, there being about 800,000,000 in the gray matter of the cortex alone, according to a computation of M. Luys. They are imbedded in a translucent granular substance —the *neuroglia*—are separated and supported, to a certain extent, by delicate bands of connective tissue, and the whole is bathed in plasma from a rich network of small vessels. Not only do we have fine nerve fibres, connecting contiguous cells together in the layers of the cortex, but we have three other classes, two of which begin and terminate in its cells. The two classes mentioned together are:

1. A system of fibres which arise in the cells of one convolution or part of the cortex, and then pass into the white substance of the hemispheres, beneath the gray layer, to become connected at the other end with the cells of the cortex of some more or less distant part of the same hemisphere.

2. Those which arise in the cells of the cortex on one side of the brain and cross over to the opposite hemisphere, to connect, in all probability, with an exactly corresponding part of the opposite hemisphere—through the corpus callosum, for example.

3. We have next the fibres, which also take their origin in the cells of the cortex, at one end, and at the other they are connected with the masses of gray nervous matter lying at and in, the base of the brain.

These latter consist of two classes:

a. Those which convey nervous impulses from the ganglia at the base of the brain upward to the cells of the cortex, to excite them to action.

b. Those which pass in a contrary direction, or from the cortex downward toward the basal ganglia. They probably convey impulses downward from the cortex.

The former may be called diverging ascending fibres. They are the superior diverging fibres of Luys. The latter are converging and descending fibres. They are the superior converging fibres of Luys. The ascending are probably sensory or excitor—the latter probably motor. Collectively, the ascending and descending fibres of the hemispheres, to which I have just alluded, constitute the *radiant crown of Reil*, or the "*Stabkranz*" *system of Meynert.*

I have referred to the above points in the structure of the hemispheres because they will be found indispensable in the discussion and interpretation of the experiments to which allusion is shortly to be made.

What are the functions of this complex nervous structure, which passes under the name of the cortex? Is it uniform in functions, any one part indifferently performing the functions of any or all other parts? Is it the organic seat of mind, or the organ distinctively of mental operations? Is it in any sense the organ of the will? Is it through its agency or power that volition is accomplished? Has it anything to do in perception, in memory, in emotion? If so, may any part be indifferently the seat of a particular volition, or are particular regions of the cortex specially appropriated to particular volitions, especially to those which purpose muscular action? Such are a few of the questions that have been raised in respect to the functions of the cortex of the brain. But the question for consideration this evening is, as to whether the gray matter in question is subservient to the purposes of muscular motion, and more particularly as to whether there are not limited regions in it worthy of the name of motor centres. This question has been broached only in comparatively recent times. I cannot, this evening, go into its history. I have done so elsewhere.

The opinion that the cortex of the brain contains circumscribed spots which are more or less directly concerned in the movements of definite groups of muscles, has an experimental basis. The experiments have been of two different kinds:

1. *Mutilating* or *destructive* experiments, which have consisted either in the removal of considerable portions of the brain in very young animals, with the view of noting the effects produced on their subsequent action and development, as in the experiments of Gudden; or in the removal of small parts of the cortex in the adult animal and observing the effects, as has been done by Nothnagel in some of his experiments, by Hitzig in some instances, by Carville and Duret, Brown-Sequard, and many others; or by the destruction of limited portions of the brain by some corrosive chemical substance being injected into it through small openings in the skull by means of a fine syringe, as in the experiments of Beaunis of Lyons, of Fournié of Paris, and Nothnagel of Freiburg in Germany; or, finally, by injection into one of the small arteries of the cortex (so as to reach a definite region) of lycopodium powder, which completely plugs the small arteries of the cortex at the point operated on, and hence abolishes its functions by cutting off its blood-supply, as in the experiments of Vulpian.

2. *Excitation experiments*, in which the integrity of the parts operated on was preserved in the main. Such were the experiments of Fritsch and Hitzig, Ferrier, Dupuy, Carville and Duret, Rouget, Putnam, Beard, and the committee of the Society of Electrology and Neurology of New York city, and many others I need not now mention. It is to the results of this last, rather than those of the first class of experimenters, that I shall refer this evening, though an eye will be had to those of the first class, and my time will not permit me to go at length into a detailed history of the excitation experiments. It is not in my plan to do so. I am to examine the general question, in the light of a few well-marked cases and of established anatomical and physiological principles. The establishment of *one* well-defined motor centre will involve the principle as truly as would a dozen.

The only two prominent physiologists who have consecrated

much time to the peculiar researches about which I am speaking, are Dr. Hitzig, of Berlin, and Dr. Ferrier, of London. Others have followed their lead with the view of either confirming or combating their opinions or results, but they are unquestionably the pioneers in this peculiar phase of physiological research. They both think they have demonstrated the existence at least of motor or psycho-motor centres in the cortex of the brain. Their opinions seem to be that certain limited tracts of cells in the cerebral cortex constitute the primary motor centres in which and on which the will acts to originate voluntary action in definite groups of muscles. The will communicates an impulse to the cells of these centres, which are thus excited to activity. An impulse is sent from them down certain fibres which stand connected with them, and this impulse is conveyed to the ganglionic motor masses at the base of the brain, and they, in turn, are excited by the impulse which has reached them from the centre in the cortex, and so on, until the muscle or group of muscles is reached which it is necessary to put in action. Now the physiologists mentioned claim that these cortical motor centres in which the will acts in the ordinary way in determining muscular motion, can be excited artificially, as they are supposed naturally to be by the will, and that they have done this by means of electrical currents of one kind or another. Dr. Hitzig used mostly in his researches a weak galvanic current, graduating its intensity, at least in some instances, by means of the rheostat, while Dr. Ferrier employed a weak induction current derived from DuBois Reymond's induction coil. In either case very delicate electrodes were used, by which means very small portions of a convolution could be excited, and in this way, in the course of their experiments, they explored pretty nearly the whole surface of the hemispheres in many animals, from the ape downwards. They certainly found many parts of the brain, which, when excited in the way stated, led with an astonishing degree of constancy to the same movements. In order to show this matter a little more plainly I will reproduce one of Hitzig's drawings and also one of Ferrier's, with their marks indicating a few of the more important centres in the brain of the dog.

No. 1 is from Hitzig's work, *Untersuchungen ueber das Gehirn.* In this sketch

a Represents the position of the centre for the muscles of the neck. It lies in the lateral part of the pre-frontal gyrus. (Owen.)

b Shows the position of the centre for the extensors and adductors of the fore legs, in the extreme outer part of this same or the corresponding part of the post-frontal convolution.

c Indicates the situation of the centre for the hind legs in the middle of the post-frontal gyrus. (Owen.)

d Shows the location of the centre for the muscles of the face, in the middle of the supersylvian gyrus or convolution. Many other centres were located provisionally by Dr. Hitzig.

No. 2 is from the memoir of Dr. Ferrier in the *West Riding Reports.* In this case

1 Indicates (9) the situation of the centre which, if excited by means of a weak induction current, caused the tail at first to be wagged from side to side, and lastly to be raised rigidly erect.

2 (14) when stimulated, gave rise to the following remarkable actions, the animal being as in the former cases under the influence of chloroform: The movements "began by wagging the tail, and spasmodic twitching of the left ear. After the cessation of the more violent spasms, the animal held up its head, opened its eyes wide, with the most animated expression, and wagged its tail in a fawning manner. The change was so striking that I and those about me at first thought," says Dr. Ferrier, "that the animal had completely recovered from its stupor. But notwithstanding all attempts to call its attention by patting it, and addressing it in soothing terms, it looked steadfastly in the distance with the same expression, and continued to wag its tail for a minute or two, after which it suddenly relapsed into its previous state of narcotic stupor," and so on for a long list of similar striking phenomena.

Beside these, other figures could be introduced to show the position of other so-called centres, but I do not have time to cite them, and happily for my purpose this is not necessary. The evidence for the existence of one motor centre is pretty much the same as that for any others. I have just shown you with some particularity what seem to be the general opinions of Hitzig and Ferrier.

The observations of these two physiologists have not been always in accord, as far as details go, and the general proposition as to the existence of definite limited motor centres in the cerebral cortex, has been vigorously combated by others, and on various grounds. This has been especially true of such observers as Dupuy, Carville, Brown-Sequard, and others. I cannot enter into a consideration of their objections in a historical order, but to facilitate discussion I have classified them. The following objections have been made, partly on experimental grounds:

1. It has been objected that the movements excited by attempts to stimulate the gray cortical layer of the hemispheres cannot be considered as indicating the existence of motor centres there, because we have reasons for thinking that the gray nervous matter is inexcitable by artificial means. The movements excited in the experiments of Hitzig and Ferrier, are really due, it is said, to the diffusion of the electrical currents downward through the substance of the hemispheres, so as to reach finally the motor ganglia, at the base of the brain, or in other words, the nucleus lenticularis and corpus striatum. But is the gray matter of the basal ganglia excitable any more than is that of the hemispheres? Such objections have been made by Dupuy, Carville and Duret, Burdon Sanderson, Braun, and others.

2. It has been further objected that the movements did not take place if the animal was profoundly under the influence of an anæsthetic. If an animal in this condition should have the electrical current applied to the cortex of the brain in the usual way, no movements took place; but if in the same animal the sciatic nerve was laid bare, and stimulated with the same current as was employed for the brain, very well pronounced contractions of the muscles of the corresponding limb occurred. It is claimed that if contractions took place in the last case, they should have done so in the first, if the cortex had been excitable, as has been claimed for it. This objection has been urged by Dupuy and others.

3. It is farther objected to the opinion as to the existence of motor centres in the cortex of the brain, that electrical excitation of the brain, after division of the facial nerve, has led in some cases to contractions of the facial muscles. It is said that the currents must have been diffused in such a case so as to excite the facial nerve beyond the cut, which fact, if true, would militate against the local action of the currents employed in such experiments as those of Hitzig, Ferrier and others. This particular objection is made by Dr. Austin Flint, Jr., of New York. And several observers, but first perhaps Dr. Dupuy, have been able to excite contraction of certain muscles by exciting electrically the dura mater, instead of the cortex of the brain.

Other objections have been made to the view which admits definite limited motor centres as existing in the cerebral cortex, especially from the domain of pathology. Such have been urged by Dr. Brown-Sequard, in a recent lecture at Boston, which has been published in the *Boston Medical and Surgical Journal.* But I will reserve a mention of his objections until a later part of this paper.

I will now pass to a consideration in order of the objections I have just stated, that we may see, if we can, what is their value and real bearing on the question before us. Then:

1. The objection based on the inexcitability of the gray matter of the cortex. This fact, if it has not been definitely settled so far as the gray matter of the cortex is concerned, has been for that of the cord. There is good reason for thinking that the gray matter of the spinal cord cannot be excited to its normal action by any known form of artificial excitation. This has been experimentally established. When it is exposed by removing the outer white substance, or when birds are taken in which, through a deficiency of the posterior commissure the central gray matter of the cord is left exposed, naturally, in its lumbar portion, when this is subjected to mechanical, chemical and electrical irritation, absolutely no response has been elicited. But it is well known this same gray matter of the cord is highly excitable through the medium of the nerve fibres which enter it. This is one of the best established facts in physiology. If a sensory nerve is irritated either by mechanical, chemical or electrical means, we may have, according to the circumstances, pain or muscular motion, reflex or otherwise, as the case may be, all of which goes to show that the gray nervous matter of the spinal cord has been excited to action. Now, what has been found true for the cord and its nerve fibres, is probably true for the gray nervous matter and fibres of the brain. It is probably true that in the experiments of Hitzig, Ferrier and others, that the action of the electrical currents was not directly on the gray matter of the cortex, but on the fibres of the hemispheres. This view has been suggested, but not followed to any considerable extent, by MM. Carville and Duret, and by M. Rouget. For it is well known that peripheral nerve fibres can be excited artifi-

cially with great ease. I see no reason myself why the white fibres which pass from one part of the brain to other parts, either in the cortex or the basal ganglia, may not be artificially excited just as truly as nerve fibres anywhere else can be. I cannot pass on, however, without asking you to remember that if the gray matter of the spinal cord and of the cortex is inexcitable by artificial means, that neither is the gray matter in the basal ganglia, such as that of the *nucleus lenticularis*, the *corpus striatum*, etc. I mention this because more than one physiologist who denies the excitability of the cortex, yet has seemed to admit the excitability of these latter bodies, but for no sufficient reason, so far as I can see.

Now what I wish to call to your attention is, that if we admit the inexcitability of the gray cortical substance,—as regards artificial excitants—we do not disprove the existence of definite psycho-motor centres in the cortex of the brain. For if they were there they could not be excited, for they are inexcitable. And it must also and equally be said, that we cannot prove their existence directly by such means. So far as the direct action of the electrical current on the gray matter is concerned, nothing is either proved or disproved. Psycho-motor centres might or might not exist in the cortex. We must depend on some other mode of settling the question as to their existence. In this phase of our question, all considerations as to the kind, strength, or diffusion of the currents are out of place. So much then as to the excitability of the cortex.

2. We come now to the second objection, viz.: that which assumes that the electrical currents employed were diffused through parts of the brain so remote from the point of application of the electrodes, that distant points in this way were probably excited, so as to produce movements through the agency of nervous centres that might have no direct anatomical or physiological connection with the parts excited. For this reason, if certain movements are produced after the electrical current is applied to a convolution, we cannot say with any certainty, what part of the brain it was, if any, the excitation of which caused the movements. In respect to this objection I have to remark:

1. That diffusion of the current through the moist brain substance appears to be well established as a fact, though probably it does not occur to the extent that has been claimed by certain observers. But though the fact should be admitted in experiments like those of Hitzig and Ferrier, yet I do not see how it can militate seriously against the general supposition that definite motor centres do exist in the cortex. Owing to the diffusion of the currents and the probable excitation of distant parts, it would render it difficult, perhaps impossible, to locate such centres by such means, even if they existed. But the fact of diffusion, if it vitiates the methods of Hitzig and Ferrier for proving the existence of the centres in question, also impairs it as a method for disproving their existence. For if they existed, the diffusion to other centres would complicate and obscure the results to such a degree that the method would be practically worthless. The method itself, therefore, includes chances for irregularities in results, which are wholly independent of a lack of a definite structure of the cortex, such as Hitzig and others have supposed. Though definite centres should exist in the cortex, from which definite groups of muscles might be called into action by the will, you will see how impossible it would be to confine the action of the current to one of them. Though the current should be directed on a very small part of the cortex, yet the movements called forth might be really due to the stimulation, by diffusion, of some remote centre. In this way then, this objection seems deprived of much of its force. Indeed if we admit that diffusion of the current occurs, it would seem rather to confirm the existence of the centres in question, when results so uniform as those of Hitzig and Ferrier are obtained in spite of it. It appears, then, that instead of disproving the existence of motor centres in the cortex, it is only shown that the method of electrical excitation is deceptive and inadequate, on account of the difficulty of limiting its action to a definite part of the brain.

2. In the second place I have to remark that it seems to me that the diffusion of currents has been carried too far, and that the phenomena attributed to this cause have not been always correctly interpreted. The more natural way of explaining them is to admit that the excitation of distant centres takes

place, not by a diffusion of current so much as by an excitation of the nervous fibres that have their origin in the cells of the cortical substance of the hemispheres, for we have already admitted that the gray matter is not immediately excitable itself. The current dips into or beneath the gray layer, and if so, would probably excite, according to varying circumstances, a few of one or all of the classes of fibres to which I called your attention in the beginning of this paper. If the current should be so directed as to excite a bundle of fibres passing beneath the cortex from one convolution to another, then the centres in one or both of these convolutions might be called into action, rather than, or conjointly with, the centre in the convolution to which the current was applied, and moreover, not by the electricity itself, but through excited nerve fibres, and hence in a natural, acknowledged way. For, though we may admit that the gray nervous matter is not excitable by artificial means, yet no fact in the physiology of the nervous system is better established than that nerve *fibres* are excitable by artificial means. If this view should be admitted, it would explain how certain movements may have been excited from widely different points, for the simple reason that the same band of fibres may have been excited at different points in its course, and very naturally the excitation would lead always, it is probable, to the same results. For it makes no *essential* difference (aside from degree) as to what part of a nerve fibre is excited, so far as its action is concerned on parts at its peripheral termination. But not only is it possible by exciting certain fibres to call into action more or less distant parts of the same hemisphere, but by reason of exciting commissural fibres, such as those that compose the corpus callosum, it may be possible to arouse to action the gray matter of the cortex of the opposite hemisphere, so as to call forth movements on the side of the body corresponding to that of the brain operated on. In this way, it is probable, can some of the contradictions and anomalies that have turned up in experimental investigation, be harmonized.

But finally, the most important observations to be made under this head relate to the fibres which descend from the cells of the cortex to the motor ganglia at the base of the

brain, such as the nucleus lenticularis and corpus striatum of each side. These fibres from a particular part of the cortex, if they were excited to action, would convey downward an impulse to some small group of motor cells in the basal ganglia, and in this way at last excite muscular motion in some corresponding group of muscles. And this would occur, not because of the diffusion of the current downward to the basal ganglia, but because the current had excited a true nervous impulse in the descending fibres, which in its turn, in the natural way, excites the corresponding gray matter of the basal ganglia. This is perfectly consistent with the fact (if it be such) of a diffusion of the current even to the corpus striatum; for, as we have seen, there is no more reason for thinking that the gray matter at the base of the brain is artificially excitable than there is to think that of the cortex or of the spinal cord is excitable. There is no proof whatever, so far as I know, that it forms an exception in this respect to the gray matter elsewhere. But on the contrary, such experiments as those of Putnam, of Boston, which consisted in dividing the fibres which pass downward from a particular region of the cortex to the motor basal ganglia, which operation seemed to embarrass or even arrest the movements which had previously occurred while the fibres were intact, or those of Hitzig of a similar kind, made with his lance reophore, can only be explained on the supposition that by dividing the fibres in question the difficulty of exciting the gray matter of the basal ganglia had been increased. This supposition also explains how it comes to pass that if a portion of the cortex is removed corresponding to some supposed centre, yet the movements can still be provoked by excitation of the white matter beneath it, for in such a case we still excite the fibres which led from the cortex to the basal ganglia, and this can be done as certainly, if not as easily, as if the gray matter was still intact, for this is admitted to be inexcitable. But these considerations are not inconsistent with the supposition that there are definite psycho-motor centres in the cortex of the brain. There is good reason to suppose that the movement of some particular muscle or group of muscles cannot be excited indifferently from any part

of the nucleus lenticularis or corpus striatum, but that particular muscles are specially represented in the same by some special group of cells. And to go a step farther, I see no good reason for not holding to the supposition that particular regions of the cortex are connected with these special regions in the motor ganglia at the base of the brain. Are the cells of the motor ganglia at the base of the brain not connected by fibres with the gray cortical substance? Every one knows they are. If so, why not have some special region of the latter connected with some special region of the former? This would be simply in accordance with what we observe, in respect to the disposition of the peripheral nervous system, in which, with great uniformity, particular regions of the body are connected with special nerves, and these with special regions of the cord. And the same observation is to be made in respect to the cerebral as well as the spinal nerves.

It seems a little singular that it should have been thought by any one that the supposition of definite motor centres, of the kind under consideration, is disproved by removing the cortex and stimulating the underlying white matter, only to find that the movements produced while the gray matter was intact are continued. Under the circumstances this is just what should be expected. To my mind the counter-experiments that have been performed seem rather to confirm their existence than otherwise. Certainly they are far from disproving it, and have been interpreted without a full view of all the essential elements that the problem involves. But I am aware I am omitting reference to many very striking experiments, the results of which have been recently published, and which would seem to call for mention in this place, but I am not aware of omitting a reference to any *kind* of experiment that ought to be considered under this head. But in my JOURNAL I have tried to have a full record made of them. Then I will dismiss, for the time, the consideration of the objection grounded on a diffusion of currents.

3. I now call your attention for a minute to the objection mentioned by Dr. Flint, of New York, and in effect also by others. You will remember that this objection was to the effect that if the facial nerve was divided (I do not know just

where in its course) that contractions could still be excited in the muscles supplied by it, though the current was applied to the cortex of the brain. In this case, if we admit that wide diffusion of the current took place, we may suppose that the peripheral end of the divided facial nerve was excited, and in this way the contractions were produced. Certainly they could not have arisen from an excitation of the nucleus for the facial. But if the diffusion was so wide-spreading in its action as it must have been in this instance, it is difficult to see why both sides of the face did not act, and, indeed, why more general convulsions did not occur, instead of being so nearly limited to the facial as they were—that is, if such limitation was a fact. But the bearing of this objection is similar to that of the second, already considered, and it is to be met by similar considerations. Hence we will pass it by, as well as the case in which movements were excited by galvanizing the dura mater. This case does not involve any essential peculiarities that those just mentioned do not.

As to the objection which was founded on the observation that when an animal is deeply under the influence of chloroform, the movements in question could not any longer be excited, while at the same time, in the same animal and under the same circumstances, and by means of the same current, movements could be excited in one of the limbs, by acting on the exposed sciatic nerve, it has the form but not the substance of a real objection. This is especially so when it is considered that chloroform diminishes nervous susceptibility, and what is the order of its action on the nervous system. It is well known, I suppose, that, broadly stated, its action is manifested in a descending order, first in abolishing the functions of the brain, and next perhaps, of the medulla and cord, and last of all probably, of the peripheral nervous system. I say when this is remembered, we may cease to wonder why it is that under its influence the central parts of the nervous system should have their excitability abolished before that of the peripheral nerves. In this way may this objection be set aside.

But now I come to the objections urged by Dr. Brown-Sequard, which are contained in an article, as already said,

published in the number of the *Boston Medical and Surgical Journal* for July 29, 1875. Some of them are new, others not, but they are all worthy of consideration. They may be summarized as follows:

1. That the psycho-motor centres, even if we admit their existence, are not situated in homologous parts of the brains of different animals, as they ought to be if they really existed. This objection Dr. Brown-Sequard thinks to be fatal to the hypothesis of definite cortical centres.

2. These centres do not differ in size as they should do, in the same proportion with the muscular masses in relation with which they stand. "One small muscle, for example, the orbicularis oculi," says Dr. Brown-Sequard, "which in bulk is certainly not even the one-hundredth part of the mass of the muscles of the anterior limb, has a centre (pointed out by Fritsch and Hitzig), which according to my experiments, is five or six times (in the dog) as large as the centre for the muscles of the anterior limb, so that the centre for the orbicularis is, proportionally to the mass supposed to be moved by it, five or six hundred times as large as it should be." (P. 121.)

3. "In the third place, according to Ferrier's researches, we find that instead of one centre, the orbicularis has three in dogs and cats, and that the sterno-cleido-mastoideus has from three to five centres, and that these various centres for one muscle are wide apart one from the other." (P. 121.)

4. He objects to their existence (motor cortical centres) because the destruction of the supposed centres does not lead to paralysis of the related muscles, as should be the case if they really existed, as it is claimed they do. (P. 122.)

5. Because in pathological cases we often have these supposed centres diseased, or even destroyed, without consequent paralysis. (P. 123.)

6. "That the character of the symptoms in brain diseases is not in the least dependent upon the seat of the lesion, so that a lesion of the same part may produce a great variety of symptoms, while on the other hand the same symptoms may be due to the most various causes, various not only as regards the kind, but also the seat of the organic alteration. In view of these facts, I have been led to believe that lesions of the brain pro-

duce symptoms, not by destroying the functions of the part where they exist, but by exerting over distant parts either an inhibitory or an exciting influence, or in other words, either by stopping an activity, or by setting it in play." (P. 119.) Such considerations militate against the hypothesis of Hitzig and of Ferrier.

7. "If we survey all the facts brought forward to support the supposition that there are distinct psycho-motor centres in the brain, belonging to each set of muscles, performing a distinct kind of movement, we find that it is impossible to admit that these centres occupy a separate, well-defined and limited territory in some of the convolutions of the anterior and middle lobes of that organ, and we find also that the supposition brought forward in the beginning of this lecture, that the nerve cells endowed with each of the primary functions of the brain, are disseminated through that organ, so that no local lesion or irritation can reach more than a part endowed with the same function, or the same kind of activity; we find, I repeat, that this supposition is supported by most of the known facts, and out of harmony with none of them." (P. 125.)

Such are the chief objections urged by this eminent physiologist to the hypothesis I am discussing this evening in your hearing. I will recall and briefly examine them in the order stated.

1. If this objection is well founded, it would be a serious, but even then not necessarily a fatal one, so it seems to me. But I am not ready, as yet, to admit it as being well founded until still more careful studies are made, on the one hand in respect to equivalent convolutions in the brains of different animals, as compared together, and on the other hand, until the location of motor centres, if they exist, shall have been made the subject of a vastly greater number of experiments, and from a more enlightened stand-point than it has been possible to occupy up to this time. I regret that my time this evening will not enable me to refer at length to the fifth memoir, in the recent work of Hitzig on the brain, entitled, *The Equivalent Regions in the Brains of Dogs, Apes and Men*, and also to numerous pathological cases bearing on this point from the clinical history of aphasia, and several cases by

Sander, Hitzig, Charcot, Lepine and others, in respect to the localization of function in the brains of men. Pretty ample reason would be found for receiving with caution this objection of Dr. Brown-Sequard. Especially will it become apparent that after all that has been done by Vrolik, Reichert, Leuret and Gratiolet, Owen, Huxley, Turner, Broca, Ecker, Meynert and others, towards a comparative study of the convolutions of the brain, that, except in a rather rude way, we are in no position as yet to declare with certainty what special convolutions, or parts of them, are truly homologous.

2. This objection, as you will remember, was based on the alleged fact, that the centre for a small muscle like the orbicularis oculi, is superficially larger than that for the muscles of the anterior limbs. But even if this objection was more than exceptionally true, it might still be explained in such way as not to render it necessary to abandon the hypothesis of definite motor centres in the cerebral cortex. In the first place it has been well established that there are a few definite centres at least, in certain animals, from which alone certain muscles can be made to contract. The application of the current to no other part of the brain, even in their vicinity, is followed by such effects. This fact—and it is a fact—should have some weight in judging of the general question. In the second place, some of these cases may be explained in a way I have already mentioned. There might be only one centre, but in varying the points of application of the current, it may be that different bundles of fibres were excited, or the same bundle in different parts of its course, but in either case, with the effect to excite the same centre from different points of the cortex. That fibres do pass from one part of the cortex to another, is a well established fact, and it should not be lost sight of in cases like this one.

Finally, I do not see why, in many cases, we may not have more centres than one for the same muscle or group of muscles, without making it necessary, on the one hand, to abandon the hypothesis of definite motor centres, or on the other, to adopt the equally hypothetical opinion of Dr. Brown-Sequard, that cortical cells having similar functions, instead of being massed together in *centres* in the cortex of the brain, as they are in

most other parts of the nervous system, are sown broadcast throughout large tracts—if not the whole—of the cortex. Of these two provisional opinions, I have no hesitation in choosing the former, as more agreeable to the analogies of better known parts of the nervous system. I have thus endeavored to meet what I have named as the second and third objections together.

3. The next objection, as you may remember, was that if the so-called psycho-motor centres are destroyed, no enduring paralysis followed, even when they were destroyed simultaneously in both hemispheres. I must confess a little surprise that this objection should have been raised. Because even by the conditions of the hypothesis of Hitzig, and others, the real motor apparatus would be left intact after the destruction of a supposed *psycho-motor* centre, which is presumed to be only an apparatus which exists to enable the will to influence the true motor system below, that is equally open to exciting influences from other quarters, but especially from those that continually play upon it from without, through the medium of sensorial peripheral apparatus. And it is to be observed that the essential motor apparatus which lies in certain of the basal ganglia and the medulla and cord below, becomes more and more independent of the cortex, or stated a little differently, of the will of the animal, the lower we descend in the scale of animal existence. If the cortical centre should be destroyed the animal would only be deprived of one means for exciting the motor apparatus to action. But even if it were otherwise, there is yet to be said, either that there may be other centres which may act vicariously for the one destroyed, or the doctrine of associated movements, which has been so well illustrated in certain paralyses, as noted by Westphal and others, and is seen also in the diffusions from one centre to others, of a nervous impulse, and which is exemplified in the last three of Pflueger's laws of reflex contraction. In this view, if a psycho-motor centre should be destroyed, and others near it should remain intact, it might happen that if an impulse should be conveyed downward from one of the neighboring centres — the corpus striatum, for example — it would spread in this latter organ to the motor cells, the cortical centre for which had been destroyed, and in this way excite action in them, and all the

more so since the inhibiting power of their related psycho-motor centre is destroyed. I only mention these considerations to show that we are not obliged to conclude that, if the cortical centres actually exist and should be destroyed, we must have a paralysis, and to show still further that we are not shut up to the sole alternative to which the objection we are now considering would limit us. But the fact is there is in nearly all cases a variable degree of paralysis, even in the experiments of Dr. Brown-Sequard himself, after destruction of so-called cortical motor centres. Does this fact not speak, as far as it goes, in favor of their existence? But whether this be so or not, I cannot regard the absence of paralysis after their removal as a proof that they do not exist. The same considerations that are now urged against the objection to the existence of psycho-motor cortical centres, because they may be removed without paralysis of the muscles in relation with which they are supposed to stand, apply to the next objection, that these same centres in man are often destroyed by disease without any paralysis. For it makes no difference whether they are destroyed; physiologically or pathologically, only so they are destroyed. If a paralysis does not necessarily follow in the first case, there is no reason to expect it in the other.

4. The sixth objection of Dr. Brown-Sequard, in the order in which I have named them, to admitting the existence of definite motor centres in the cortex, may be profitably divided.

First then we may notice that part of it in which he says "that the character of the symptoms in brain diseases is *not in the least dependent on the seat of the lesion*, so that a lesion of the same part may produce a great variety of symptoms, while on the other hand the same symptoms may be due to the most various causes, various not only as regards the kind, but also as regards the seat of the organic alteration."

You will observe that the language in this case is, that "*the symptoms in brain diseases are not* IN THE LEAST *dependent on the seat of the lesion, etc.*" Can it be possible that it is his opinion that disease of a given part of the brain, thus understood, does not give rise to constant symptoms? Is

it possible that the brain is an almost absolute exception in this respect to other organs of the body, and, indeed, to most other parts of the nervous system, the spinal cord for example? Is it possible that exactly the same kind and degree of a lesion of a definite part of the brain will give rise at one time to one class or kind of symptoms and at another to another kind, and so on, every time producing different phenomena or symptoms? His statement would seem either to imply that the various parts of the brain—cortex, if you please—if it can be said to have parts, either have the most variable or miscellaneous functions, or none at all. It seems also to be in conflict with that fundamental maxim in all science and philosophy worthy of the name, that like causes produce like effects. For, if I correctly understand him, he would have us believe that the same lesion of the same parts will produce different effects, and *vice versa*. For my own part, I cannot look upon the present unsettled state of our knowledge of the structure, functions, and diseases of the brain in any such discouraging way. The present uncertainty which prevails in the diagnosis of many brain diseases depends on a want, as yet, of a correct or exact knowledge of the actual structure of the brain—a want of a similar knowledge of the functions of its special parts, such as a more profound study of its anatomy and physiology, I believe, will reveal in the future, and, because of the positive errors that now prevail on these subjects, that the progress of future research is destined to clear away, and especially on account of the want, hitherto, of thoroughness in working up the *ante* and especially *post-mortem* histories of brain diseases. I assert, in the most unhesitating manner, that the lists of cases, say of cerebral hæmorrhage, which are collected by such writers, for example, as Gintrac, and on which reliance appears to be placed by Dr. Brown-Sequard, useful as they are on many accounts, are for all purposes of exact study and reliable induction, nearly worthless. In many of them hurried and superficial examinations were made, and in nearly all careful microscopic examinations, which are absolutely essential to correct positive and negative knowledge in a case like the present, were wanting. If I had the time I would quote for

you several complete histories as they are given by M. Gintrac in his valuable work, which would probably be but fair samples of the cases on which the utterance above cited is based. I will, however, quote one of them *verbatim* from page 4 of the seventh volume of his *Cours Theorique et Clinique de Pathologie Interne et de Therapie Medicale.* It is as follows: "Male. Fifty years. May. Delirium, loquacity, irregular movements of the members (dyspnœa, crachat pruriformes). Death. Pia mater adherent to the brain at the *anterior and inferior part* of the right middle lobe. Cortical layer, *to the extent of two convolutions*, filled with grumous blood, mixed with cerebral tissue. Subjacent medullary substance intact. Brain soft. Pleuritic exudations, nodules of pulmonary hepatization, pericarditis, softness of the heart." (Bravais—*Revue Medicale*, 1827, T. I., p. 405.) Besides this case that is selected at random, there are forty-two other cases of pretty much the same character, in which more or less limited hæmorrhages were declared to have been found in the cortical substance, and the most various symptoms are recorded. Now what shall we say of conclusions based on a study of such cases as this? Is it any wonder that, if they were relied on, the observer might reach such a conclusion as Dr. Brown-Sequard has done? What part of the brain proper was diseased in the case I have quoted? Why, the "anterior and inferior part of the right middle lobe," and beside this the "brain was soft." But the point in these remarks is this, that it is by the study of a collection of similar cases that Dr. Brown-Sequard reaches the conclusion that "symptoms in brain diseases are not in the least dependent on the seat of the lesion," etc.! And conclusions based on a study of such cases are to be placed in the scale against the results of careful physiological experiments conducted on limited parts of the living healthy brain! In contrast with this discouraging view of the physiological pathology of the brain, it is a comfort to find M. Charcot, perhaps the most eminent clinical neurologist now living, giving expression to quite different views. In the last few numbers of the *Progres Medical* I find a series of lectures by M. Charcot on localization in cerebral diseases (especially see *Progres Medical* No. 27, p. 352,

1875), in which, after citing numerous striking cases of localization, he says: "These examples will suffice, I think, to convince you that it will be possible one day in man, and very probably in the near future, to judge in the last resort, on the most indisputable evidence, the doctrine of localizations, in respect at least to the superficial parts of the brain."

I do not think, therefore, the doctrine laid down by Dr. Brown-Sequard is well founded, and that it is not to be regarded as a real objection to the general supposition that definite motor centres exist in the cortex of the brain. The second part of this objection is, that local brain diseases "produce symptoms, not by destroying the functions of the part where they exist, but by exerting over distant parts either an inhibitory or an exciting influence, or, in other words, either by stopping an activity or by setting it in play." But, in the first place, I cannot see that this mode of action of one part, not for itself, but through or on some other part, is any better established or understood, especially as respects the brain, than the direct action of the parts of the brain. It is certainly a more complex way of explaining certain kinds of cerebral action, and, though the principle is well established, yet its application so freely to cerebral action, as Dr. Brown-Sequard seems inclined to make, appears to me largely hypothetical, if not gratuitous. What proof have we, indeed, that local lesions of the brain give rise, not to symptoms that directly depend on the nature of the functions of the part which is the seat of lesion, but to phenomena which come into visible play only after a series of hidden and inconstant "ricochets" of the positive or negative influence originating at the seat of injury? But very little that I know of. But after all, this view, if I understand it correctly, does not have the bearing it seems to have been intended to have. Even though it should be true that the phenomena manifested in many brain diseases are not referable directly to the part that is the seat of lesion, but rather to the consequent modified action of other parts upon which the diseased part has acted, this would yet grant indirectly all that had been claimed directly. It would admit that the diseased part exerts either an exciting or an inhibitory influence on some other portion of the brain,

which in its turn, gives rise to the apparent phenomena. This is consistent with the hypothesis of Hitzig and Ferrier, for they have supposed that certain parts of the cortex in a state of excitation or disease might exert an influence on parts of the basal ganglia in a manner in reality not different from the plan of Dr. Brown-Sequard, which we are at present discussing.

And this ends the list of principal objections of Dr. Brown-Sequard to the supposition that definite psycho-motor centres exist in the cortex of the brain, and, at the same time, all I can find time this evening to say as to their force and logical value. In spite of the force that will be accorded to them—no small part of which will depend on his great personal authority—I am persuaded that such centres do exist, and I hazard the prediction, if such it can be called, that the time will soon come when the supposition which admits such centres will ripen into a certainty which none will question. While I speak thus I am well aware that this doctrine is not clearly established, yet I expect to see not only the existence of such motor centres established, but also sense centres, and perceptive centres, and centres for different kinds of memory and emotion, etc., and all in this wonderful nervous structure, the cortex of the brain. Since writing the above, the number of August 28th (p. 277), *British Medical Journal*, has come to hand, which contains certain statements made at the last meeting of the British Medical Association by Dr. Lauder Brunton, in behalf of Dr. Ferrier, which, in so far as they are reliable, seem to confirm my statements. I will read them:

"In the absence of Dr. Ferrier, Dr. Lauder Brunton gave a brief summary of the main results. The method followed was the comparison of the effects of electrical irritation with those following localized destruction of parts of the brain by means of the actual cautery or scalpel. The two sets of experiments supported and explained each other. The most important fact demonstrated by this series of experiments was the localization of regions of special sense in the convolutions; and this, along with localization of centres of motion proper, served to clear up the true significance of the reactions to electrical stimulation. 1. Destruction of the frontal regions

of the brain, which gives no reaction to electrical stimulation, is without effect on sensation or voluntary motion, but causes marked impairment of intelligence and of the faculty of attention. 2. Destruction of the gray matter of the convolutions bounding the fissure of Rolando causes paralysis of voluntary motion on the opposite side of the body, sensation remaining unaffected; while lesions circumscribed to areas previously localized by the author, caused paralysis of voluntary motion limited to the muscular action excited by electrical stimulation of the same regions. 3. Destruction of the angular gyrus causes blindness of the opposite eye, the other senses and voluntary motion being unaffected. This blindness is only of temporary duration, provided the angular gyrus of the opposite hemisphere remains intact. When both are destroyed, the loss of visual perception is total and permanent. 4. Destruction of the superior temporo-sphenoidal convolutions abolishes conscious reaction to auditory stimuli, the other senses and voluntary motion remaining unaffected. The results of destruction, taken with the effects of electrical stimulation of this region, indicate that it is the centre of auditory perception. 5. Destruction of the hippocampus major and hippocampal convolution abolishes the sense of touch on the opposite side of the body. 6. Destruction of the *subiculum cornu ammonis*, taken with the results of electrical stimulation, indicates that this is the seat of the sense of smell for the same side of the body. 7. Destruction of the gray matter of the lower part of the temporo-sphenoidal lobe in immediate relation to the region of olfactory perception abolishes the sense of taste. 8. Destruction of the optic thalamus causes complete anæsthesia of the opposite side of the body. 9. Ablation of the occipital lobes produces no effect on the special senses or on the powers of voluntary motion, but is followed by a state of depression, with refusal of food, not to be accounted for by mere constitutional disturbance. In one case, which survived the operation for three weeks and was then killed, the appetite returned: a phenomenon probably to be accounted for by compensatory association. The sexual appetite, however, was exhibited during the first few days after the operation, as judged by the behavior of the animal to a

companion monkey. 10. Ablation both of frontal and occipital lobes in one monkey did not interfere with the powers of sensation or of voluntary motion."

I am led to adopt the opinion that definite motor centres exist in the cortex of the brain for other reasons besides those already stated, but I have no time in which to present them this evening. But at some future time I will give them, and also will endeavor to state with some fullness the physiological and pathological deductions that we seem justified in drawing from the general doctrine of Hitzig and Ferrier.

Art. II.—PATHOLOGY OF DRUNKENNESS—IS IT A DISEASE, OR A MORAL DELINQUENCY?

By N. S. Davis, M. D., Chicago.

DURING the last fifteen years, a number of institutions have been established in or near some of the larger cities of our country, for the sole purpose of reforming those who had become habitually addicted to the excessive use of intoxicating drinks. Three or four years since, many of the officers connected with these institutions met in convention and organized a permanent association, and adopted a series of propositions relating to the nature and treatment of drunkenness. Among these propositions we find the following:

"1. Intemperance is a disease.

"2. It is curable in the same sense that other diseases are.

"3. Its primary cause is a constitutional susceptibility to the alcoholic impression.

"4. This constitutional tendency may be inherited or acquired.

"5. Alcohol has its true place in the arts and sciences. In excessive quantity it is a poison, and always acts as such when it produces inebriety."

This unqualified assertion that inebriety is a *disease*, to be treated and cured on the same principles as other diseases, led many, especially of the religious part of the community, to regard it as equivalent to a denial of the moral guilt and responsibility of the inebriate. Hence they were inclined to look with disfavor, not only upon those who promulgated the doctrine, but also upon the asylums with which they were connected.

It is probable, however, that the differences of opinion on this subject have arisen mostly from different modes of interpreting the same forms of expression. If, by the word "intemperance" as used in the first proposition, is meant the condition of a *person* who is addicted to the habitual use of alcoholic drinks, and that such person is in a diseased condition mentally and physically, surely very few who have paid attention to the subject will deny the correctness of the proposition.

Alcohol is a material substance, and, when drank, produces its effects on the various structures of the body, disturbing and perverting their action. And when the dose is often repeated through considerable periods of time, as is the case with habitual drinkers, these disturbed and perverted actions in the tissues become more or less permanent—morbid or diseased conditions. In this sense, then, intemperance is a disease. On the other hand, if we make the word "intemperance" apply to the primary mental act or volition which determines the individual to drink alcoholic beverages, as would be done by most theological and non-medical writers, we cannot call it a disease, unless we adopt the theory that all evil thoughts or volitions are diseased conditions of the mind. The association, however, during its annual meeting the next year after it had adopted the propositions we have quoted, removed all cause for misunderstanding by adopting the following, as recommended in the report of a committee to whom the subject had been referred:

"But that the understanding of this whole matter may be, if possible, more complete, we add a concise statement of the

views of the physicians, superintendents and others represented in this association. They hold, with great unanimity, the opinion that *inebriates* are persons who, being in the regular or occasional habit of using intoxicants—by whatever name known — in quantities which produce their specific effects, in greater or less degrees, *have become diseased.* That the disease so induced (and, as a rule, only so induced)—whether denominated inebriety or dipsomania—is not necessarily a simple, but frequently a complex disease, involving the digestive apparatus, the blood and the nervous system, and to such an extent in the latter case, especially, that the will-power—the power of self-restraint—is often suspended, and, in incurable cases, destroyed."

As thus explained, the assertion that "intemperance is a disease," means simply that the use of alcoholic drinks to the extent of inducing intoxication produces a morbid or diseased condition of the blood, digestive organs, and nervous structures—a proposition, the truth of which is too obvious to need any discussion.

But the third and fourth propositions quoted above are not so satisfactorily explained by the committee. The assertion that the "*primary cause*" of intemperance "is a constitutional susceptibility to the alcoholic impression;" and that such constitutional susceptibility "may be *inherited* or acquired," is certainly without satisfactory proof. It is strictly parallel with the assertion often made by a certain class of writers, that the appetite or craving for exhilarants, or so-called stimulants, is a *natural* or instinctive impulse inherent in the mental and physical organization of the human race. The only proof, however, that they ever adduce, is the general assertion that all nations, whether civilized or uncivilized, have some kind of intoxicant to which they resort. If we should say that man is so constituted that he is capable of feeling weary, restless, despondent and anxious, and that he instinctively desires to be relieved of these unpleasant feelings, we should assert a self-evident fact. And we should thereby assert all the *instinct* or *natural impulse* there is in the matter. It is simply a desire to be relieved from unpleasant feelings, and does not in the slightest degree indicate or suggest any

particular remedy. It no more actually suggests the idea of alcohol or opium than it does bread and water. But if by accident, or by the experience of others, the individual has learned that his unpleasant feelings can be relieved, for the time being, by alcohol, opium, or any other exhilarant, he not only uses the remedy himself, but perpetuates a knowledge of the same to others. It is in this way, and this only, that most of the nations and tribes of our race, have, much to their detriment, found a knowledge of some kind of intoxicant. The same explanation is applicable to the supposed "constitutional susceptibility," as a *primary* cause of intemperance. That some persons inherit a greater degree of nervous and organic susceptibility than others, and are in consequence more readily affected by a given quantity of any kind of narcotic, anæsthetic, or intoxicant, is undoubtedly true. And that such will more readily become drunkards, if they once commence to use intoxicating drinks, is also true. But that such persons, or any others, have the slightest inherent or constitutional taste or longing for intoxicants, until they have acquired such taste or longing by actual use, we find no reliable proof. It is true that statistics appear to show that a larger proportion of the children of drunkards become themselves drunkards, than of children born of total abstainers. And hence the conclusion has been drawn that such children *inherited* the constitutional tendency to inebriation. But before we are justified in adopting such a conclusion, several other important facts must be ascertained. 1st. We must know whether the mother, while nursing, used more or less constantly some kind of alcoholic beverage, by which the alcohol might have impregnated the milk in her breasts and thereby made its early impression on the tastes and longings of the child. 2d. We must know whether the intemperate parents were in the habit of frequently giving alcoholic preparations to their children, either to relieve temporary ailments, or for the same reason that they drank it themselves. I am constrained to say, that from my own observation, extending over a period of forty years, and a field by no means limited, I am satisfied that nineteen out of every twenty persons who have been regarded as *hereditary* inebriates, have simply *acquired* the disposition

to drink by one or both of the methods just mentioned, after birth.

I have known some families to become very nearly extinct in the third generation, by excessive intemperance. But in every instance the children were accustomed to the use of the alcoholic liquids from their infancy, which was sufficient to account for their persistent yielding to the alcoholic craving in mature life. That children begotten and nursed by intemperate parents are more liable to be imperfect in development and weak in physical vitality than others, is true. According to the facts thus far put on record, a much larger proportion of children born of such parents, die in infancy and youth, or exhibit mental defects, than of those born of the temperate. That individuals inheriting such defects in mental and physical vigor, should more readily fall victims to the influence of alcohol when brought to bear on them, is to be expected. And so they do to all deleterious influences, simply because they have less vital resistance. But there would be no more propriety in claiming that such cases had a "constitutional or hereditary" tendency to the use of alcoholic drinks, than to the use of any other poisonous or deleterious agent. It is no more a *constitutional tendency* to intemperance than to ague or dysentery; for their lack of constitutional vigor makes them yield more readily to the causes of the latter as well as of the former. From a careful and patient study of this subject, we are constrained to admit but one *primary* and essential cause of intemperance or inebrity: and that is, the habit of using some kind of alcoholic drink. Such use may have commenced by receiving it in the mother's milk, or as a medicine or drink during infancy and childhood, or by voluntary choice in maturer years. We have not sufficient proof to justify the assumption that any person has been, or will be, born with a constitutional tendency to, or an appetite for, the use of intoxicating drinks. Such an appetite is created *only* by the actual impression of alcohol on the living structure of the individual. For adopting the *habit* of drinking, by which the appetite or craving is established, either the individual or his parents and guardians are morally responsible, in the same sense as they are for the adoption of any other injurious and evil practice.

That the appetite, when established, is *a disease* affecting the physical organization of the individual, must be evident to every well informed inquirer. That this disease may be carried to such a stage that it wholly overpowers the volition or will, or mental power of self-control, on the part of the individual, is abundantly proved by daily observation.

Conceding that the habitual use of intoxicating drinks is capable of establishing the disease called *intemperance*, we next inquire concerning its pathology, with a view to a better understanding of its appropriate treatment. The morbid effects of alcohol on the human system are various, depending on the manner of its use and the accompanying circumstances. When used habitually in small quantities, through long periods of time, its chief morbid effects are seen in fatty degenerations of structure, more particularly in the liver, heart, arteries, kidneys, etc., although it may never have produced intoxication. But when taken to the extent of frequently inducing inebriation, or what is generally called intemperance, there is induced a peculiar morbid condition of the cerebro-spinal nervous system; a morbid condition essential to the inebriate. What is the nature of this condition? Certainly not one of irritation, inflammation, or even of excitement, but primarily during the intoxication, one of anæsthesia.

A careful analysis of the phenomena of intoxication will show, that from the incipient diminution of sensibility to outward impressions as indicated by the light, airy sensations and less guarded speech, to complete muscular paralysis and loss of consciousness, the process is one of steadily increasing diminution, both of voluntary sensation and motion. But this anæsthetic effect is only a part of the morbid condition, for the alcohol, having a strong affinity for the albumen of the tissues, not only lessens the sensibility of the nerve structures, but it retards the atomic or molecular changes in such a degree as to interfere with the appropriation of new atoms and the removal of old ones, as in the healthy process of nutrition and disintegration. And hence, when the first or anæsthetic stage is passed, there is left in all the delicate nervous structures an altered condition of the molecular arrangement, consisting in the presence of an undue number of effete or useless cells or

molecules and a deficiency of new and freshly added ones, producing that sense of weakness, exhaustion, despondency, and irresolution or mental timidity, always manifested in a greater or less degree, in the sequel of a period of intoxication. If the period of intoxication has been prolonged through several weeks, this derangement of the molecular condition of the brain may be carried so far that the organ becomes incapable of performing its mental functions with coherence, and delirium tremens is the result. If this interference with the molecular changes in the nervous structures is frequently repeated, as in the habitually intemperate, the morbid condition becomes more permanent, and the sensations of weakness, sinking, irresolution, consequent thereon, really constitute what is usually styled the *appetite* or *craving* for more of the accustomed anæsthetic. The craving of the drunkard is by no means a mere relish or love of the taste of alcoholic liquors. On the contrary, to many of them the taste of the liquor is actually repugnant and loathsome. But that indescribable sense of sinking and uneasiness, caused by the defective molecular changes in the cerebral structure left after the anæsthesia has passed, is what prompts them to renew the draft, despite of its bad taste, the protest of friends, or even the conscious conviction of the utter ruin to which it may lead. If the foregoing views are correct, we must regard intemperance as involving both moral delinquency and physical disease. The moral delinquency, for which the individual or his guardians are fully responsible, consisting in the adoption of the *habit* of drinking alcoholic or intoxicating drinks, knowing the evil consequences to which such habit leads, while the *disease* consists in those effects of alcohol on the functions and structures of the human body already described. The latter may be carried so far that the individual loses all power of self-control or reform unless subjected to positive or forcible restraint by others. This view of the subject leads directly to the conclusion that a proper and efficient treatment of the intemperate must combine both moral and medical means; for which, asylums or special institutions, when well managed, afford great advantages.

If we are guided by the ordinary monthly, quarterly, or

even annual reports of these institutions, we shall find the proportion of cures or reforms generally stated as high as 50 to 75 per cent. of those admitted. As many of those admitted are periodical drinkers, however, it became a matter of great interest to ascertain how far those reported reformed remained so permanently. For this purpose the executive committee of the Washingtonian Home, of this city, after the institution had been ten years in operation, appointed a committee to investigate carefully the whole list of former inmates. And, after a very thorough investigation, the committee reported as follows:

REPORT OF COMMITTEE ON STATISTICS.

CHICAGO, JANUARY 9TH, 1875.

To the Board of Directors of the Washingtonian Home:

Your Committee appointed at the Annual Meeting, January 19th, 1874, for the purpose of gathering statistics in regard to the work accomplished by the Home since its commencement, have performed to the best of their ability the labor assigned them, and only regret that it could not be made more complete and satisfactory. When it is remembered that the institution commenced its career in the heat of the great civil conflict, when family and business relations were necessarily unsettled, and that but recently, as it were, the conflagration of 1871 drove from the city large numbers of persons to seek homes and business elsewhere, and amongst whom were many who had been inmates of the Home, the difficulties in the way of obtaining their present whereabouts and status can be more readily appreciated. Your Committee have spared no pains to effect this object, and have secured much and valuable information, the results from which will, it is believed, be gratifying to the managers and friends of the institution, and satisfactorily answer the question so often asked, "What good has the Home accomplished?"

Your Committee have obtained and recorded in a book provided for that purpose, the names of all who have been inmates of the Home from December 12, 1863, to January 1, 1875

inclusive, and have inserted a condensed history as far as practicable in each individual case.

The present whereabouts of many it is impossible to trace, there being no clue to guide us, except their mere name upon the register. This is owing in a great measure to the custom of former Superintendents in receiving inmates without admission papers, and as has occurred in a number of instances, of not even registering their names, or opening accounts against them upon the books of the institution.

There are many letters of inquiry now out, to which answers are due, but have not up to this time been received; but as it was the desire of the Board to close the labors of the Committee by a final report at this your annual session, we herewith respectfully submit it with the annexed carefully prepared statistics, which we trust will meet with your approval.

Number of persons admitted		970
Males	964	
Females	6	
		970
Total Number of admissions		1,488
As follows:		
Admitted once	696	
" twice, 154, equivalent to	308	
" 3 times, 63, " "	189	
" 4 " 23, " "	92	
" 5 " 12, " "	60	
" 6 " 9, " "	54	
" 7 " 8, " "	56	
" 8 " 1, " "	8	
" 11 " 2, " "	22	
		1,488

AGES.

Under 20 years	4	
Between 20 and 30 years	202	
" 30 " 40 "	422	
" 40 " 50 "	213	
" 50 " 60 "	68	
" 60 " 70 "	9	
Over 70 "	1	
Unknown	51	
		970

Average age of inmates, 36½ years.

Married	397	
Single	551	
Unknown	22	
		970

HABITS.

Hereditary	137	
Acquired	807	
Unknown	26	
		970
Constant	318	
Periodical	623	
Unknown	29	
		970
Have had Delirium Tremens	257	

NATIVITY.

United States	563	
Foreign	365	
Unknown	42	
		970

PRESENT STATUS.

Reformed	196	
Hopeful	218	
Doubtful	443	
Hopeless	113	
		970
Number of Deaths	94	

Of the above 196 reformed, 140 were periodical drinkers, and 56 were constant drinkers.

Those marked as "hopeless" include that class known as chronic inebriates; as well as a large number of those who have deceased, and whose deaths can be directly traced to alcohol.

The 196 known to have been reformed constitute a small fraction over 20 per cent. of the number admitted. Adding to this 20 per cent. of those who are considered "very hopeful," would give us 240 reformed, or within a small fraction of 25 per cent. Again adding one-half the above ratio, or 10 per cent. of those marked as "doubtful," which includes a large number of those whose history could not be traced, but whose conduct as inmates was good, we have 284, or within a small fraction of 30 per cent. of reforms. These estimates are considered fair and impartial, and your committee deemed it wisest to avoid the custom adopted by similar institutions, and by an overestimate create a false impression in the minds of the Directors, as well as the public (should these results be published) as to the amount of real good performed by the institution.

H. C. MOREY, } *Committee.*
W. McFARLAND, }

If it is remembered that the stay of inmates in the Home is entirely voluntary, and often of short duration; and that they are generally confirmed or chronic inebriates, we shall regard the proportion of *permanently* reformed, as stated in the report, abundantly encouraging.

It has seemed to me that three things are essential to the permanent and full restoration of the inebriate. First, his judgment must be fully satisfied by intelligent conviction that alcoholic drinks not only injure him when taken in what he calls excess, but that they are wholly unnecessary in any of the relations of life. Second, his conscience must be awakened fully to the fact that the voluntary use of such drinks, after knowing their destructive effects, is a crime against himself and against society. Third, he must be kept steadily under judicious hygienic and medical treatment until sufficient time has elapsed to fully remove, by renewal of structure, both the functional and molecular changes made by the previous use of alcoholic drinks. In cases of periodical drinking, careful efforts should be made to ascertain, as accurately as possible, the time of the recurrence of these periods, and the circumstances attending their beginning, for the purpose of specially guarding, both by hygienic regulations and medicine, against their approach.

ART. III.—TWO CASES OF EXOPHTHALMIC GOITRE, ASSOCIATED WITH CHRONIC URTICARIA.

BY L. DUNCAN BULKLEY, A.M., M.D.,
PHYSICIAN TO THE SKIN DEPARTMENT, DEMILT DISPENSARY, NEW YORK.

URTICARIA has for some time been regarded as a neurosis of the skin, but the positive evidence in favor of such an opinion in regard to the ætiology of the disease has heretofore rested wholly upon a few clinical phenomena. The sudden formation and disappearance of the wheals, the often periodic character of the disease, and the absence of any

true histological lesion, except the œdematous swelling of the epidermis and upper portion of the papillary layer, have seemed to indicate but a transitory disturbance in the blood supply, which Auspitz,* after studies on the cutaneous circulation, thinks is produced by the reflex transmission of an irritation from sensitive to vasal nerves, an opinion already expressed by others.

Going a step further, we have neural influence in urticaria exemplified in those cases † where other forms of nerve disturbance are observed in the same individual. Thus, to quote some instances recently recorded by Dr. Clifford Allbutt: "Mrs. H. belongs to a highly neurotic family. Is liable to intense migraine and to gastralgia. Is a 'terrible martyr to urticaria.' Miss C. consulted me for obstinate neuralgia. Her brother came to me a few months later, complaining of a curious and obstinate form of urticaria. He himself is of very nervous temperament and has migraine. Mrs. S. has spasmodic asthma and urticaria. Two of her children have eczema."

Yet another advance in the neuro-pathology of urticaria is made by Charcot ‡ in connecting this disease with sclerosis of the posterior columns of the spinal cord, or locomotor ataxia. He mentions the case of a woman treated at Saltpétrière, where enormous patches of urticaria appeared with each accession of the pains, and just over the spots where most pain was felt. Gailleton § also gives an interesting case of ataxia with attendant urticaria for many months, as follows: A woman, aged 32, of good constitution, had for a year failure in co-ordination of movements, a characteristic gait, feebleness of the arms, darting pains in the limbs and along the vertebral column, the sensation of constriction at the waist, and pricking in the hands and feet. Six months after the commencement of the disease, strabismus and facial paralysis occurred, which have disappeared spontaneously. At the time, these appeared

---

* *Archives of Dermatology*, vol. I., No. 4, p. 333 (*Vierteljahr. f. Derm. u. Syph.*, 1874, p. 311).

† *The Practitioner*, Nov., 1874, p. 323.

‡ *Leçons sur les Maladies du Systéme Nerveux*, 1872, 1873, p. 68.

§ *Traitè Elèmentaire des Maladies de la Peau*, 1874, p. 286.

the patient complained of sharp cutaneous pain, and numerous patches of urticaria appeared on the arms, thighs, neck and trunk. These urticarial *plaques* lasted individually but a few hours, but were reproduced with great rapidity on different parts of the body, and were accompanied with most distressing pruritus. The eruption persisted for nearly a year.

Exophthalmic goitre, Graves' or Basedow's disease, is now pretty uniformly looked upon as a nervous affection, a functional, or possibly structural disorder of the sympathetic. It were out of place here to discuss its manifestations or nature, and the two following cases serve to illustrate quite fully the leading features of the disease without further introduction. The symptom of urticaria is one that might readily be expected from the nature of the disease, and I am led to contribute these cases as furnishing another link, which I deem very important, in the chain of evidence connecting urticaria with nerve disturbance. Cases of this disease in the male are also comparatively rare, and the first one, from the completeness of the history, may be of value.*

Case 1. Thomas M., aged thirty-one, a gilder by occupation, not married. When about fourteen years of age he was apprenticed to a gilder; previous to this he had been healthy, with the exception of occasional headache, which he ascribes to a fall he received when a boy. As an apprentice, he was obliged to work very late at night, sometimes until one of two o'clock in the morning, working also on the Sabbath. In busy seasons he would often work thus for several weeks in succession. It was occasionally necessary for him to lift and carry heavy weights. During his apprenticeship he often noticed having palpitation of the heart, coming on and disappearing at times. Three or four years ago the palpitations gave so much trouble that it was with difficulty that he could walk up stairs,

* As a further contribution to exophthalmic goitre in the male, I may allude to another case in private practice, of which I have notes, in a man aged 52, where palpitations and ocular protuberance are the main features, the goitre symptom being very slightly pronounced. He has, however, never had any symptoms of cutaneous disorder traceable to the disease. These three are all the patients with Graves' disease which it has fallen to my lot to observe scientifically.

and they would often start him out of his sleep; these have continued more or less at times, and he was recently under treatment for them. While an apprentice, he as well as his friends, noticed that his eyes were at times "swollen," would appear strange, more so at one time than at another, recovering themselves between times; the left eye was more prominent than the right. For a number of years he has noticed that his collar at times has been too small for his neck, at other times it would be too large; he has wondered at this, but does not recollect noticing otherwise any swelling of the thyroid. About three years ago he was much troubled with noises, "like the sound of water," in the left ear; he has also had left hemicrania, lasting for several days, which would be relieved by lying on the affected side. He has had from time to time swellings of the face, quite transient, which would even make the eyes to appear sunken; these have occurred as recently as two months ago. Has also at times noticed temporary swellings and puffiness of the hands and feet. Has been subject to diarrhœa and hæmorrhoids, but not to epistaxis. He gives the history of acquired syphilis about nine years ago, for which he was treated internally, and apparently cured; there are at present no traces, past or present, of the disease. He masturbated when a boy, but asserts that he has not done so for ten years; he then had frequent nocturnal emissions, never in the day. He has never been a hard drinker, uses beer moderately, has been drunk a few times. When an apprentice he chewed tobacco, but only for a year, since which he smokes, sometimes as many as ten pipes-full of tobacco, of medium strength, daily. When he has had the palpitations, the smoking has increased them, now it has the effect of making him sleepy.

Present condition. He is a large, well-developed man, about 5 feet 10 high, light complexion and hair, blue eyes. Bowels regular, tongue slightly coated and pale; eats and sleeps well now. Pulse 84, varying somewhat on the quarter minute, being 19 at one and 21 at another, but no irregularity of beat can be made out. Most careful examination of the heart fails to detect any enlargement, nor does the stethoscope reveal any abnormal sounds. There are no pulsations, tremor or thrill over the large vessels of the chest or neck, or over

the thyroid body. Lungs healthy. But slight enlargement of the thyroid can be felt, though the whole neck appears rather large. The eyes present a very characteristic appearance, the *stare* is evident on entering the room. Both eyeballs protrude, the left very markedly so. The upper eyelids follow the eyes fairly when the patient looks down, but the lower lids do not follow the eyes when looking upward; much of the sclerotic is seen below, and the appearance differs much from that of healthy eye-movements, placed in comparison. He has but little control over the right eye; he can with difficulty leave the right open to any extent when closing the left voluntarily. The pupils respond perfectly to light, and are symmetrical. At night he has flashes of light, both with the eyes open and closed; has at times seen objects double, but now sees but one image. The vision of the right eye is normal; with the left (most affected) eye there is a blurring at a distance of three feet. He was formerly annoyed much from suffusion of tears when looking at an object for a length of time, but this has passed away.

About a month ago he began to suffer from urticaria, which has continued and increased in severity. At present there are urticarial wheals on the legs, arms and trunk, exhibiting all the characteristics of the ordinary disease; the eruption is not very abundant, but the distress is considerable and the wheals are continually being formed anew. When the body is stripped, and the skin rubbed quickly and firmly with the point of a blunt instrument, as the end of a brass door key, the skin is quickly reddened, and shortly elevated ridges appear, which soon pale and resemble lengthened wheals.

The urine presents no striking anomalies; morning and night specimens moderately acid; both have a specific gravity of 1.020; rather abundant mucous deposit, and a few amorphous urates in each. At no time during his visits has the pulse ranged over 93; there are some irregularities, the quarter minute giving successively 25, 22, 24, 22 beats.

Case 2. Mrs. —, aged 45, was delicate and sickly when a child. Was married at 18 years of age, but separated from her husband after 4 months; she had a miscarriage at 3 months, and has never been completely well since. She is of

full habit, bowels and menses regular, tongue coated, pulse 84, weak; has had chronic rheumatism.

The history of the Graves' disease dates back a number of years—at least five years previous to my seeing her. This diagnosis was made by a prominent oculist whom she consulted about the projection of her left eye. She has been treated much of the time ineffectually by various physicians, remaining with each long enough only to experience more or less benefit, and then changing. The eyes exhibit clearly the peculiar appearance of patients with exophthalmic goitre, the left one being more strikingly prominent, and being of but little service for vision, she soon losing control of it. The other phenomena of the disease have been present for some years—irregularity of the heart's action, and at times severe palpitation, and enlargement of the thyroid—but this is not so very marked.

Five years before coming to me she experienced a severe nervous shock, and dates her skin trouble from that period. She states that she has not perspired since. She began then to have "a fine rash and redness all over the body," and itching. This continued about the same, off and on, for four years, when, after being weak and exhausted, and having various hysterical difficulties, the itching became more general, and an eruption corresponding to that now existing appeared. Lumps would form on the forehead and on various parts of the body; sometimes the face and head would appear greatly swollen.

When first seen she was in a pitiable state of nervous anxiety: the itching of the feet and toes and sometimes of other parts of the body she described as agony. At the first visit there was not so much to be seen on the skin, but there were a few urticarial blotches on various parts of the body and limbs. While under observation, however, she had several acute attacks of skin trouble, all of the same sort. On one occasion she woke with the upper lip greatly swollen, and with swellings on various parts of the body. On the following day, when seen, the whole face was swollen and puffy; on the middle of the forehead there was a large erythematous lump, also one beneath the right eye, and smaller ones about the face. The hands were swollen; on the right hand near the little finger

there was an erythematous patch, somewhat swollen and with two small vesicles on it. There were also various erythematous and urticarial blotches about both hands and wrists; and on the back of the left hand, near the thumb, there was a red spot with the skin broken, as if the seat of a former vesicle. The whole surface of the skin burned as if scalded or scratched; there was no pain on deep pressure. On another occasion, a day or two after there had been, according to her statement, numerous swellings on various parts of the body, the remains of several were visible on the right cheek, and on the arms there were numerous stains, some of them quite dark, as if the parts had been bruised—the remains of the lumps; the hands and arms were manifestly swollen, and there were urticarial wheals on the limbs and body.

REMARKS.

After very considerable search, not only in the literature of skin diseases, but also in that relating to ophthalmology and general medicine, the journals and Hospital Reports, I can discover nothing similar to the cases above given, and I find but four allusions to any relations of the disease in question, exophthalmic goitre, to cutaneous changes. Trousseau * says, "I have noted besides, in this woman, a symptom to which attention has not yet been called, and which I should like observers to look for, namely, the *cerebral macula.* If the epidermis be slightly irritated, after two seconds at most, a beautiful red stain is seen, which lasts nearly a minute. I can hardly believe that there is not, in this case, very marked *asthenia of the vaso-motor nerves*, in consequence of which the capillaries dilate rapidly, easily and persistently under the influence of the slightest irritation, just as happens in cerebral fever and in some ataxic cases of typhoid fever." Neumann,† when describing urticaria, says, "The efflorescences of urticaria have a resemblance to the elevations of erythema nodosum, and *to those œdematous swellings which appear in connection with Basedow's disease, or exophthalmic goitre*," giving Stellwag as authority for the latter allusion. I am unable to find any

---

* *Lectures on Clinical Medicine*, Philadelphia, 1867, vol. I., p. 558.

† *Lehrbuch der Hautkrankheiten*, 3d edit., 1873, p. 156.

reference to this.* The two other references to any skin symptoms in exophthalmic goitre relate to pigmentary disorders, and are as follows:

In one of the cases recently reported by Bartholow,† a lady aged 54 had, for about 15 years, some of the symptoms of Graves' disease, and during the last year pigment deposits occurred about the neck and sternal region, and on the hands. "The skin of these pigmented spots is rough, and gives off fine furfuraceous scales; they are surrounded by abnormally white integument."

Raynaud ‡ gives four cases of Graves' disease where there existed on the skin the peculiar discolorations known as *leucoderma* or *vitiligo*, and quotes another case from Trousseau.§ All these cases were in young females, the ages of four of them being given, respectively, 20, 25, 24 and 25 years. In three of Raynaud's cases the state of the skin is carefully described, so as to leave no doubt as to the diagnosis of leucoderma. In his last case, and in Trousseau's, it is simply stated that vitiligo was present. In the first of Raynaud's cases, the one most accurately described, the discolorations existed only on the back of the neck; in the second on the neck, arms, legs and breast, with a zone of the disease around the lumbar region, irregular in outline; in the third case, and in that of Trousseau, the location of the vitiligo is not given; and of his last case he says, "the patient presented on the legs patches of vitiligo which encircled them like two garters." The exophthalmic goitre was marked in these cases, and in three of them was accompanied with epileptiform convulsions at times. In one of the cases Raynaud states that he looked for the *cerebral macula* of Trousseau, to which I have alluded, but was unable to obtain the reddened lines on irritating the skin with the nail.

There can be no doubt but that the state of skin described by Trousseau in his case of exophthalmic goitre was the same

* Stellwag—*Treatise on Diseases of the Eye.* Hackley & Roosa, New York, 1868, p. 437.

† Chicago Journal of Nervous and Mental Disease, July, 1875, p. 351.

‡ *Archives Générales de Médicine*, June, 1875, p. 679.

§ *Clinique Médicale de l'Hôtel Dieu de Paris*, tome II., p. 575. I find that Trousseau's words "plusieurs taches de *vitiligo*" are translated "freckled in some parts," in the Sydenham Society's edition of his work, Philadelphia, 1867, vol. I., p. 569.

as observed in the case I have given first, and the "œdematous swellings" which Neumann accredits Stellwag with having noticed in these cases, correspond to the changes I have recorded in the second case. That the skin lesions I observed in both cases properly belong under the head of urticaria, I have no hesitancy in affirming very positively; and I feel very confident that these states of the skin will be seen oftener, if searched for, in cases of exophthalmic goitre.

In looking for an explanation of the occurrence of this lesion of the integument in these cases, a very ready and plausible reason presents itself. As I mentioned at the beginning of this article, the clinical phenomena of urticaria are *neurotic*, and its lesion can be explained on no other grounds than capillary disturbance, having its origin in some derangement of nerve influence.* I have traced it as associated with other symptoms, commonly reckoned as *neurotic:* migraine, gastralgia, neuralgia and "nervousness;" next, it was found associated with lesions of the *spinal cord*, as in sclerosis of the posterior columns, in locomotor-ataxia; and now, in these two cases, we find it associated very directly with disease, functional or other, of the *sympathetic*, for such, in our present knowledge, we must regard the complex phenomena of Graves' disease, or exophthalmic goitre.

I have elsewhere, quite recently,† endeavored to show that very many skin diseases possess nerve elements of great importance, and argued against the propriety of making a separate class of neuroses of the skin, as liable to mislead in practice, and said that while on pathological grounds I would be inclined to "make herpes-zoster a true neurosis, around which we may, as time rolls on, be able to construct a class of neurotic affections of the skin, I cannot at present feel justified in separating the neuroses from other skin diseases without including eczema, whose neurotic elements are so painfully thrust upon our notice every day. The true nerve alterations connected with it have not yet been demonstrated, it is true, but do they not exist?" Nor do I yet yield urticaria solely to the

* I am aware of the theory of spasm of the cutaneous muscles, but cannot find any plausibility in it.

† *Archives of Electrology and Neurology*, Nov., 1874, and May, 1875.

class of neuroses, although next to zona it has had its nerve elements best demonstrated; and pathological evidence of change in nerve structure seems alone to be wanting to render its position absolutely certain. But when we consider it more closely, I think the clinical and therapeutical elements of this disease will separate it widely from herpes-zoster, where the skin lesion appears to depend so clearly on nerve and ganglionic inflammation.

We know urticaria to occur from irritating ingesta, in which case the nerve agency is probably a direct one reflected from stomach to vaso-motor nerves; in like manner Scanzoni* has recorded some highly interesting cases where it was produced by the application of leeches to the uterus, and it is quite possible that other cases may occur from the irritation of some other organ, as the bladder; possibly some of the obstinate cases are due to rectal troubles, as worms, ulcerations, fissures or hæmorrhoids, giving rise to irritation. But we know urticaria also as coming from true digestive disorders, as in a case of Lallier's,† where fish eaten for breakfast produced no eruption till 6 o'clock in the evening, and then there was no other disturbance, no nausea or vomiting. The urticaria, there, was the result of the circulation of some wrong elements of food, and was not a primary reflex affair from the stomach. Dr. Maclagan‡ found a deficiency of urea excreted by a patient with chronic urticaria; the urea and uric acid were augmented many-fold and the patient cured, by means of colchicum. Then again we have urticaria apparently due to malarioid disorder, as in the intermittent forms, and these quinia and arsenic cure. One would err greatly, I think, in ranking urticaria among the neuroses in the same manner in which we rest zona, with its inflammation of the nerve ganglia and infiltrated nerve sheaths; but that urticaria possesses nervous features of very great import is undeniable, and not the least remarkable and interesting of these is the one to which I have called attention, namely, its connection with exophthalmic goitre.

---

* *Edin. Med. Jour.*, Oct., 1860. Jones—*Functional Nervous Disorders*, 1864, p. 463.

† Wilson—*Lectures on Dermatology*, 1873, p. 109.

‡ *London Lancet*, (Am. Reprint) Oct., 1846, p. 366.

Art. IV.—ON CHRONIC SUB-ACUTE NEURITIS.

By Dr. H. M. Bannister, Chicago.

THE following case appears to me to present points of interest sufficient to justify its publication, not merely as one of an obscure and too little understood disorder, but as throwing light on a certain class of questions of the pathology of peripheral nervous affections. It also illustrates the difficulties in diagnosis which these troubles often present to the physician, and which were very strikingly manifest in its various phases and its development.

F. Williams, of Swedish parentage, twenty-three years of age, married, of fair bodily development, light complexion, always healthy up to the date of the beginning of his present ailment, and with no hereditary tendencies to disease, as far as known, sent for Dr. J. S. Jewell, June 26th, the statement of the messenger being that he was suffering from some kind of rheumatic disorder. The following statement of the previous history of the case was obtained at this and subsequent visits by the writer:

The patient, a painter by trade, was following his occupation of decorating agricultural machinery in a manufactory at Rock Island,. Ill., during the preceding winter and early spring. At his boarding place, he stated, he suffered much from cold, sleeping in a cold room with insufficient bed clothing, being scarcely able to keep comfortable in ordinary weather, and on cold nights enduring considerable discomfort. From motives of economy, however, he made no change, regarding the cold as only a temporary inconvenience, and, being in good health otherwise, he paid very little attention to it. He gradually felt that it did him harm, and, moreover, he contracted a severe cold, which settled on his lungs, he said, affecting his voice and embarrassing his breathing. On the evening of March 11th, while standing still, not engaged in any work or exerting or straining himself in any way, and without any

such exertion immediately previous, he felt all at once a very severe pain in the left groin, so severe as almost to take him off his feet. The patient could not describe the feeling very well, but he stated that it was a kind of stabbing pain in the groin, that it radiated down his thigh in frequent paroxysms, and that at these times it was scarcely endurable. After some three hours' suffering and constant friction with liniments, etc., the pain abated considerably, and the next day he was at his work as usual. There remained, however, considerable soreness and weakness, and he found himself unable to continue for any length of time, even for a few minutes, in a standing position, and was obliged to do all his work sitting. Both pain and weakness rendered this necessary. During this period of his disorder, lasting two or three weeks, there was no perceptible trouble felt in the hip-joint, the pain being all referred to the groin and extending down the thigh, not passing below the knee. According to the patient's statement, his cold and chest trouble left him entirely on the first appearance of the pain.

About three weeks after the first attack, while standing in a shop, he was suddenly jostled and rather roughly brushed against, his thigh receiving the principal part of the shock, and he immediately felt a recurrence of the former pain, though not so severely as on the first occasion. From this time on, however, the paresis became much more pronounced and locomotion almost impossible. He had to use two sticks at all times, and he stated that this was not solely on account of the soreness and tenderness of the limb, as might be supposed, but because of actual weakness, independent of the pain. He still continued to work for a time, but was at last compelled to give it up on account of his weakness, and he returned to his home in Evanston, Ill., in the latter part of April. The journey on the railroad, and especially the transfer by omnibus through the city of Chicago, aggravated his trouble, and caused great pain ; nevertheless, after his arrival at home, he was still able to be about for a few days, walking with the aid of canes.

During all this time he had consulted two physicians of Rock Island and vicinity, but was unable to give the details

of their treatment, except that one of them had treated him for rheumatism and he had been blistered extensively, the evidences of which were still very apparent on the lower internal aspect of the thigh. After his arrival at Evanston he placed himself under the charge of a regular physician, who put him on a general tonic treatment, and for the neuralgic symptoms prescribed Brown-Sequard's anti-neuralgic pills, which, as put up by Bullock & Crenshaw, contain a proportion of nux vomica. Whether or not, as they both thought, the results were in any way to be attributed to the medicine, his symptoms were greatly aggravated from this time on. For several days he was unable to lie down, move about, or straighten his left leg; he passed both night and day sitting up in a chair, suffering intensely from acute pains shooting down his thigh. The reflex excitability was so greatly exaggerated that the mere approach of a person, or any sudden start whatever, caused painful involuntary contractions of the flexors of the leg. About this time, also, he noticed that the left foot became red and swollen, and an old scar upon it, almost invisible in health, became again prominent, and took on an angry red appearance. This swelling of his foot extended only above the ankle to where he had tied the lower end of his drawers, the slight constriction at that point seeming to cause all the trouble.

After some days of this state of affairs, during which the patient declares that he scarcely slept, he was got into bed, extension was applied to the limb, the more uncomfortable symptoms gradually disappeared, and the leg became straightened.

About this time another physician was called in consultation, and it was agreed, I understand, that the most probable interpretation of the symptoms was that disease of the hip-joint existed. There was some swelling and tenderness about the joint, especially behind and above the trochanters; movement of the joint, and especially any pressure of the articulating surfaces against each other, was painful; there was no noticeable tenderness detected along the course of the principal nerves; the preceding symptoms had closely resembled those of the second stage of coxitis, and, altogether, there

seemed to them to be no reasonable doubt as to the diagnosis. During all this time treatment by internal medication had been continued, but I have no information as to its details.

At the time when first seen by Dr. Jewell and myself, the patient had dismissed his physicians, and had been under his own treatment for about three weeks. He had taken no medicine except occasional laxatives, and had removed the extension apparatus on account of some slight discomfort it produced. We found him lying on his back in a natural position, his limbs straight, his general condition fair. He had then been confined to his bed altogether about two months, only sitting up occasionally for a few minutes at a time to allow it to be made up or changed. Every movement out of it was attended with some pain, and was impossible without assistance. His condition at this time was as follows:

General health and bodily condition fair; as good as could be expected in one who had been bed-ridden for two months. Owing to a fracture of the right femur some years previously, and which had been neglected and improperly set, there was a considerable deformity of the right thigh, which interfered with an exact comparison of the two legs as to wasting of the muscles, etc.; the right leg, however, was from an inch to an inch and a half shorter than the other, the muscles of which were softer and, perhaps, slightly wasted. All the movements of the foot could be performed with ease, flexion of the leg at the knee caused pain, and the patient stated that any extensive movement of the kind was impossible on account of weakness; as he lay in bed he made only some slight quiverings of the extensor muscles, and a very slight movement of the knee by the flexors. Any adduction of the thigh was impossible. Tenderness existed all around the hip-joint, and the tissues in that region were somewhat swollen; the tenderness was especially noticeable on pressure being applied over the great trochanter and behind it in the sciatic notch. It was also marked in the groin, and below, over the adductor and pectineus muscles, and to some extent also on the posterior aspect of the thigh. Extension of the limb caused slight pain; sometimes referred to the knee and sometimes to the groin; the same effects were also observed from compression.

The patient stated that at one time he had been able to feel a hard cord on the back of the thigh, in the position, as he described it, of the sciatic nerve. We could not detect this at the time with certainty.

There were decided evidences of vaso-motor disturbance, the temperature of the two thighs was quite different, as was apparent to the touch, the diseased limb being much the warmest, and in places profusely perspiring, while the other was dry and normal as to temperature. The sensibility appeared very slightly, if at all altered, the reflex excitability on the other hand seemed perhaps slightly diminished. The patient complained of pain whenever the limb was moved, but his chief trouble was from painful startings at night, especially as he was falling asleep. These occurred every night and sometimes so often as to seriously interfere with his rest.

Taking into consideration all the symptoms and the history of the case, we considered that we had to do with an irritative or inflammatory condition affecting the obturator nerve and probably also implicating the crural nerve. The only treatment we prescribed was as nearly as possible complete rest for the part and the use of the galvanic current, with the occasional use of small blisters around the hip-joint and moderate friction or massage of some of the affected muscles. The galvanic current was applied from fifteen to twenty-five cells of a Stohrer battery, at first every day and then every second day, the anode being applied over the tender parts, and the negative pole at some distant point, each application lasting ten or fifteen minutes.

After three weeks of this treatment, a very noticeable improvement in many of the symptoms was manifest. The startings at night had entirely disappeared, the swelling around the joint had gone down and the tenderness to pressure in the sciatic notch and along the course of the sciatic was almost entirely absent. That in the groin, however, still continued apparently in no wise abated; extension of the leg and compression of the hip-joint still caused pain, though to a less degree than before, the pain being referred occasionally to the knee and occasionally to the groin as previously. A much stronger pressure on the great trochanter was also required to

produce pain than was the case when first seen. The muscular power was much increased, and the patient was strongly inclined to exercise it, so that absolute rest of the part could no longer be insured without some restraint. He complained also at this time of one or two small sores on the sacral region, which made a change of position absolutely necessary at times. At this time the tactile sensibility of the two limbs, as tested by the æsthesiometer showed very slight differences, if any, in favor of the well leg.

On the twenty-fifth of July the condition of the patient was perhaps not quite so good; the sores on his back had interrupted his rest and he began to show a few signs of increasing tenderness about the hip-joint. At this time I tested the electric excitability of the muscles by means of the faradic current and found much less difference between the two limbs than might have been expected; the electro-contractility of the affected muscles being apparently but slightly diminished. The same current was also applied with the wire brush as a counter-irritant for a few seconds. The result of all this manipulation seemed unfavorable; that night his rest was much broken, the tissues around the hip-joint were again swollen, and radiating pains down the course of the sciatic, which again showed a slight tenderness, were complained of. The patient also experienced starts in the other leg, a symptom that had previously been almost entirely absent, though once or twice noticed. These unpleasant symptoms however quickly disappeared with the use of the galvanic current; the sores over the sacrum having healed under proper management, I placed his leg in a molded starch and pasteboard splint to secure absolute rest, and at the end of the first week in August he was again comparatively comfortable. While the pains were worst in the knee and groin, and along the inner and anterior aspect of the thigh, one of the superficial veins in that region, possibly the saphenous vein, became hard and prominent, could be easily felt and even seen as a hard cord under the skin. It should be mentioned here, having been omitted in the proper place, that the patient stated that this symptom was still more noticeable at an earlier stage of his disease, while the blister had been kept open for days

on the lower and inner aspect of his thigh. No bad consequences seemed to follow it on either occasion, and it disappeared entirely in a short time.

The only treatment other than that mentioned has been such as seemed indicated by the general condition of the patient, tonics occasionally for his general health, laxatives for the bowels, etc.

The present condition (Sept. 15) is as follows: General health good in the main, bowels constipated, appetite fair. No bodily symptoms except in the affected limb and joint. The bed sores have nearly ceased to trouble the patient and are about healed up. There is no pain except on pressure or movement, and a dull aching in the knee part of the time. Adduction of the limb is impossible, but abduction and partial flexion can be performed. The tenderness on pressure exists in the inguinal region, and slightly in the upper anterior aspect of the thigh, and it is occasionally experienced over the great trochanter and behind it. Strong compression or extension of the hip-joint usually causes pain in the joint itself or in the knee or groin, sometimes in one or the other, sometimes in both places. There seems to be no uniformity in this regard. The symptoms about the hip-joint are still very variable, sometimes worse, sometimes better, occasionally a slight swelling of the surrounding tissues, and then the tenderness, etc., and the pain in the knee are most felt. Any irritation, cold, etc., arouses this condition, which however speedily subsides again. There is at present some pain on movement of the knee, but no tenderness to pressure at that point, a symptom which has been occasionally present during his sickness. The electro-muscular contractility of the muscles of the front of the thigh is now very much diminished; a faradic current which produces a very strong contraction of those of the well leg, scarcely causing a perceptible tremor in those of the affected one. This statement applies not only to the muscles which scarcely respond at all to the will, like the adductors, but is also true of the quadriceps femoris, the sartorius and the tensor vaginæ femoris, which still can be excited to voluntary contraction. The electric sensibility seems normal at the present time.

The tactile sensibility, that to temperature, pain, etc., are not noticeably different in the two legs; there may possibly be a slight decrease in the former, but it is not very decided. If it exists anywhere it is in the upper thigh and groin. The wasting of the affected limb is, for reasons already given, not very apparent at first sight, but is readily seen when the attempt is made to move the muscles, those of the well leg appearing much fuller in volume. Motion of the hip-joint does not cause much pain, much less at present than at some former times. The vaso-motor phenomena, the local perspirations, differences in temperature between the two legs, etc., are no longer prominent. The neuralgic starts at night are rare, occurring only once a week, or still less frequently, while formerly they were felt several times each night, seriously disordering sleep. They are now, also, less painful than formerly, and are, I think, merely indications of increased reflex excitability of the spinal cord, attributable, perhaps, to the enforced dorsal decubitus. As a rule the patient sleeps well at the present time. The pain excited in the groin by every sudden start, or the simple act of coughing or sneezing, which was a noticeable feature in the case up to quite a recent period, has now almost if not quite entirely disappeared. There is also at present much more power in the muscles than there has been for a considerable period. They seem to be regaining their strength to a considerable extent.

There are several deficiencies in the above account which I regret. First, accurate instrumental determinations of the temperature of the affected parts as compared with the corresponding well ones, in the earlier period, when it came under our observation, would have been highly desirable. There seems to me however no question as to the actual facts; the patient's own testimony as to his subjective sensations and my own actual observations of his condition the first few occasions he was visited, the local perspirations, etc., leave no doubt in my mind as to there being an actual and quite considerable difference of temperature in the two legs at certain times. Then again, the test of the electro-muscular contractility was not made in the earlier stages with the faradic current; when it was first made it showed a difference, but

not a very remarkable one. The sensibility to the current seemed exaggerated; although the mildest current from the instrument (Galvano-Faradic Co.) was employed, it was declared to be painful, and the single attempt to use counter-irritation with the wire brush, which had preceded it, was stated to be absolutely unendurable. The consequences of this trial, as was stated in the account, were also unfavorable.

Notwithstanding these imperfections of the account, I consider the observation to be one of very considerable interest. It would, no doubt, be classed by many observers, according to common loose usage of the term, as a somewhat peculiar case of lumbo-abdominal neuralgia, involving, to some extent, the sciatic, and perhaps other nerves. I prefer however our own diagnosis and the name of neuritis which we have given it, as expressing more correctly the actual pathology. And this will lead to the question as to the actual relations of neuralgia and neuritis, a question extensive in its bearings and one which requires much space for its thorough consideration. It will be impossible to treat this question exhaustively in a paper like the present, but it will constantly suggest itself in the discussion of the diagnosis of the case under consideration.

Perhaps the majority of the writers who have mentioned neuritis as a distinct affection of nerves, have classed it among the rarer diseases. A great majority do not mention it at all, or only as a possible pathological process in the course of some more generally recognized disorders. A few, and among these are some of the highest authorities in neural medicine, have not only given it a place in their nosology, but have made it the real pathological condition of very many affections with which it is not usually connected in the mind of the physician. In fact, the diagnosis of neuralgia, based on the symptom of pain and the absence of marked central disorder, has been generally sufficient without closer inquiry into the true cause of the pain. As Hammond says, this name has been more abused than any other.

In the case I have related the character and situation of the pain were such as to warrant its separation from the neuralgias properly so called. The pain, though not persistent, was con-

stantly along the tracks of certain nerves, and especially that of the obturator and its superficial branches; it was called out by pressure, and was absent nearly all of the time when this was not applied; it was not generally of the true neuralgic character, lancinating or stabbing, and was not specially marked at the points of Valleix in contrast with other points. Erb * gives as the diagnostic points of chronic neuritis the constancy of the pain, the lack of the sharply defined Valleix points, and the appearance of motor and sensory paresis. Some of these were well marked in this case; others, however, failed, or at least were less prominent than might have been expected; for instance, the sensibility of the two limbs showed at no time any very decided differences, and it was not altogether satisfactorily certain from the first whether the motor paresis was really as great as it appeared to be or whether its appearance was not at least in part due to pain. The lack of a sufficient electrical examination of the muscles, in the early and later stages alike, is to be regretted on this account. The apparent lack of wasting of the muscles to any great extent also, for a considerable period, throws some doubt on this point. On the other hand, I have the positive statements of the patient as to his inability, and I have no reason to doubt his honesty; he was constantly inclined to use his muscles, and the mechanical restraint of a splint was found absolutely necessary on this account, and at present there is no question either as to the atrophy or the paralysis. There was a slight but very apparent difference in the electro-contractility of the muscles of the two thighs when first tested, and those of the diseased leg were all along much softer than those of the other. The fact, also, that in cases of neuritis the motor functions often remain intact while sensibility suffers, may also have a bearing here. In this case, sensory phenomena were wanting, when almost an absolute paralysis was complained of; it is aberrant also in this respect. Other cases, however, have been observed, in which sensibility was little disturbed, by Bernhardt † and Lannelongue, ‡ and a recent author,

* "Krankheiten der Periph. Cerebro-Spinal Nerven." *Ziemssen's Handb. f. Spec. Path. u. Therap.*, XII., 1. Article, "Neuritis."

† "Zur Pathol. des Radialis Paralysis." *Arch. f. Psych.*, IV., 3.

‡ *Gaz. des Hopitaux*, 1872, 122. Quoted by Bernhardt.

Chapoy, has stated that in radial paralysis sensibility may be either normal, diminished or exalted, when the cause is traumatic compression of the nerve, while the electro-muscular contractility is always affected; in that due to cold, on the other hand, the electric excitability is preserved. If this statement is correct, it may help explain some circumstances in the observation I have narrated. Erb also states that in the lighter forms of this disease, even if notable paralysis is present, the electric excitability may remain normal, actual degeneration of the nerves being required to bring about any decided change in this respect. The late disappearance of the electric contractility of the muscles in this case, and the rapid progress of this disappearance of muscular contractility during the later period up to the present time, and the present peculiarities of the case, are interesting, but I do not think that they at all invalidate the diagnosis of neuritis.

The trouble in the hip-joint, one of the most constant, and at the present time the predominant symptom apart from the paralysis in this patient, seems to me worthy of notice. There is possibly and very probably a slight sub-acute inflammation in the joint, similar in all respects, except perhaps in degree of intensity, to those described by Weir Mitchell,* Remak and others, as following nerve and spinal lesions. In this case the symptoms are not at all neuralgic, properly speaking; at the present time there is very little or no swelling around the joint, but strong pressure on the articulation causes acute pain as long as it is continued. There is no hyperæsthesia; a light touch is not painful, but the pain increases with the force used. It seems to be easily lighted up to a more acute stage by any irritation or exertion; it was, for example, much aggravated by the application of the faradic current on one occasion, and again by slight attempts at muscular exertion at another time; in each case, however, it rapidly subsided again under proper treatment. There may be some suspicion that the trouble in this case is allied to the neuralgic affections of the joints described many years ago by Brodie, and which more recently have formed the subject of papers by Stromeyer,

---

* *Sanitary Comm. Memoirs*, Med. Volume, and *Injuries of Nerves*, p. 168.

Wernher, Esmarch, Meyer, Paget and other authors. The absence of any hyperæsthesia, and indeed, the usual absence of pain except under pressure or movement, and its character when felt rather separate it from that category. The painful points mentioned by some authors in cases of the neuralgic affection do not exist in this case, at least not at the present time. The pain is only felt from pressure or extension of the articulation, and is referred either to the joint itself, or to the groin, and more rarely to the knee also. The patient is, moreover, not specially nervous, and in no ways hysterical; he is inclined rather to make light of than to magnify his symptoms; there are no disorders of the urinary or digestive apparatuses as far as can be detected, to account for the trouble in a reflex way. It is a question in my mind whether in many of these cases there may not be an actual inflammatory condition of the nerves of the joint. In this case I am inclined to think, without expressing too positive an opinion, that there is, if not a sub-acute inflammation of the articulation, a neuritic, or at least an irritative condition of the articular nervous twig from the obturator and perhaps other nerves of the joint, which might readily produce trouble.

Another feature in which this case is peculiar, and which has been already alluded to, is the absence of sensory phenomena, such as formication, numbness, etc. in the affected limb. The patient, on being closely questioned, stated that he had on one or two occasions felt as if his foot was asleep, but he paid no attention to it, and thought it nothing unusual. Apart from this, no special or striking symptoms were noted as regards sensibility.

Nocturnal exacerbations of pain and neuralgic starts occurred in the earlier period of the disease, and disappeared entirely under treatment. During the partial relapse at the end of July, they re-appeared again to some extent. Their disappearance under the use of the galvanic current is the most strikingly successful result of all the treatment up to the present time.

The occupation of the patient, that of a painter, is a point worthy of mention in connection with his disorder. I am not, however, satisfied that it had any direct bearing on the case.

It is somewhat hard to sum up in brief the principal points in this case, which, in my opinion, justify the diagnosis of neuritis, its general *ensemble* and history having as much to do with the decision as anything. I should say, however, that the character and localities of the pain, the wasting of the muscles, the peculiar paralysis, which I am convinced was to a great extent real from the first, and not involuntarily simulated from pain, and the trouble in the hip-joint, its character, etc., are the symptoms that at the present time indicate that the case is one of neuritis rather than neuralgia.

The history of the case is instructive, as showing some of the difficulties in diagnosis. It will be seen that at different times the patient has been under treatment for rheumatism, sciatica, and coxalgia, and each time with some apparent show of reason. The first of these, however, would hardly have been suspected from the symptoms and with the history given, at the time the case was first seen by myself. At the beginning of the trouble, the time when the diagnosis of rheumatism was actually made, it was more justifiable. Hip-joint disease was very strongly indicated at the time when the case was treated for that affection, and the disorder had not then so far progressed as to enable one to exclude it by the aid afforded by its history.

As regards the parts of the nervous system directly involved, I am inclined to consider the trouble as at first confined to the obturator nerve, then gaining the crural plexus it involved the crural also. The paralysis and loss of electro-muscular contractility over the whole front of the thigh speaks in favor of this view. I do not think that the sciatic or any branches of the sciatic plexus are implicated to any extent. Flexion of the leg, though embarrassed, has always been possible, and no motor or sensory trouble whatever, except general weakness, probably from disuse, is or has been experienced below the knee. The movements of the foot are now and have all the time been perfect. The pains felt by the patient in the sciatic region were probably due solely to reflex irradiation, and the cord felt by him on the under side of the thigh was a purely subjective observation; I could detect nothing at all abnormal in that region.

There are up to the present time no evidences of any cen-

tral trouble; the cord seems still unaffected. In some respects the nervous symptoms have improved; the muscles certainly seem to have more power than formerly; still the trouble has been so far progressive, and the implication of the centres at a future time is not at all impossible.

The principal reason why neuritis is so seldom recognized lies in the fact that an anatomical demonstration of its existence is rarely practicable during life, and often fails even when examination is made for this purpose in post-mortems. Moreover, we know that nerve trunks may pass through the midst of inflamed tissues and be unaffected themselves, and that an active inflammation of a nerve is one of the most difficult of all processes to excite experimentally, at least beyond the point directly irritated. Add to these facts the difficulties of clinically determining with any degree of exactness the condition in a nerve, especially in its sub-acute, and as I believe, more common form, and we can readily see why it has so far been considered one of the rarer if not the least common of diseases.

Still there has always been at least a suspicion that many forms of peripheral nervous troubles, usually classed under the head of neuralgia, might be due to an actual, if not an active inflammation of the nerves affected. In fact, perhaps the customary way of considering the pathology of neuralgias in general, even while rejecting the theory of neuritis, is that there is some peripheral change or process that produces the pain. This view has been ably combated by Vulpian in his preface to the French edition of Weir Mitchell's work on nerve injuries (see this journal for April, 1874), in which he shows that the hypothesis of central alterations accounts better for the facts observed in many neuralgias; but it is still maintained by many writers on these subjects. For example, Dr. T. M. B. Cross, in a recent paper on sciatica,* one of the forms, however, of neuralgic affection which, in my opinion, offers the most doubt as to its true nature, states that he considers it to be due to minute molecular changes in the nerve, as yet unrevealed by the microscope, but which will become known to us at some

* *Psychol. and Med. Legal Journal*, Aug., 1874.

future time. This, perhaps, will represent as well as anything the views commonly held as to the pathology of neuralgias, where indeed any are held at all.

Of course the symptom of pain is a central phenomenon, and may be, and probably is often due solely to central irritation, as indeed we have sufficient proof in some cases, such as when it is referred to the extremities of an amputated member, and in the neuralgic pains of posterior spinal sclerosis, tumors, etc., and all the forms of reflex pain. In these latter cases we may have no evidence whatever of any peripheral alterations at the points where the pain is felt. And this we hold to be the true pathology of most neuralgias. A peripheral irritation involving no gross change, and transient in its nature, may set up a severer and permanent irritation in the centre for the reception of impressions from that part, or this latter trouble may arise independently of any peripheral disorder whatever. Tetanus and hydrophobia are very striking examples of exaggerated central disorder, often, as far as we at present know, excited by transient and limited peripheral irritation.

When, however, the peripheral trouble causing the pain is permanent, the case is rather different. We know with certainty of but one or two processes that may take place in nerve trunks and cause pain; others have been suggested but they rest on no actual observation, and it may be questioned whether the hypothesis of their existence is absolutely necessary to account for any known facts. Thus we know that active irritation of any kind, mechanical or otherwise, of sensory nerves may cause pain, and it is highly probable that innutrition, from any cause whatever, which perhaps is to be properly considered as only a kind of irritation, will do the same. Whatever in fact disturbs the balance, whether it be irritation or over-excitation of a normal nerve, or the desperate attempt on the part of a weak and under-nourished one to perform its normal functions, which in reality amounts to the same thing, may produce pain; and besides these we know of no other abnormal conditions that can produce it. A very large proportion of so-called neuralgias, in my opinion, are due to one of these two causes acting on peripheral nerves without central alterations—that of active irritation. And without making the

term neuritis so extensive as to include all merely irritative states, which nevertheless differ from inflammatory states only in degree, I believe that it expresses the true pathology of very many of these cases. Our proofs of the correctness of this view are, of course, largely inferential, clinical observations being only available for their demonstration. We cannot experimentally reproduce the exact conditions of what are called idiopathic nerve disorders with any certainty; if this were possible it could be so only by a fortunate accident, and then the embarrassments of observation on the lower animals might be so great as to preclude any very satisfactory results. But such evidence as we can produce seems to me of considerable value, and we have moreover a certain weight of authority on this side of the question. To say nothing of the older writers like Descot,* who considers many cases of sciatica to be cases of chronic neuritis, and even goes so far as to admit the possibility of all neuralgia being of this nature, we have Hasse,† who is inclined to consider as neuritis a large class of neuralgias depending on the irritation of introduced foreign substances and those in which anæsthesias and motor paralyses appear, those depending on pressure from tumors, etc.; Remak,‡ who considers sciatica as usually the result of a neuritis, and Weir Mitchell,‖ who rejecting the theory that implication of other nerves than the one primarily affected in wounds, etc., is due to reflex irritation, credits it to the propagation of inflammatory changes along the course of the nerve to the plexuses, thus implicating other branches. A very recent writer, M. Landouzy,¶ has divided the sciaticas into two groups, the neuritic and the neuralgic; the former including those cases in which there is atrophy of the muscles of the affected limb with tenderness on pressure over the nerve. Erb also allows that the common opinion as to the rarity of

---

* *Affect. local des Nerfs*, Paris, 1822.

† *Krankh. des Nervenapparates.* Virchow, *Spec. Pathol. u. Therap.* IV., 1, 1855.

‡ *Oesterr. Ztsch. f. prakt. Heilk.*, VII., 48, 1861.

‖ *Sanitary Comm. Memoirs*, Medical Volume, p. 412.

¶ *Arch. Gen. de Med.*, April and May, 1875. Abstracted in *Schmidt's Jahrb.* and *Revue des Sci. Medicales.*

this affection can no longer be held as correct, and that it, even in its spontaneous form, is much more common than has generally been supposed. I might cite other authorities, but these are sufficient to show how the hypothesis of neuritis has been invoked to explain many morbid symptoms for which other theories appeared to competent judges to be less satisfactory.

It is one of the most difficult tasks to draw the line between a mere abnormal irritation in a nerve trunk and an actual inflammatory condition of the same. An acute neuritis is, it is true, easily diagnosed, but this is truly very rare as an idiopathic affection, and we have to do in this paper solely with the sub-acute forms of this disorder. But, as has already been said, the difference is only one of degree—the difficulty lies in deciding where one ends and the other begins. And I have no doubt that the line of demarcation is more seldom passed in these organs than in most others; they are comparatively but slightly vascular, and their tissue seems in many cases especially resistant. There is one thing, however, that points very strongly to a close connection between the two states of irritation and inflammation in the nerves, namely, the fact that an inflammatory process set up in one place in the nerve may excite the same condition after a given time in a distant part, without any intermediate neuritis. Thus Tiesler * excited local neuritis in the sciatic nerves of rabbits and dogs, causing paraplegia and death three days later, and the autopsy showed acute inflammatory changes at the seat of irritation and at the point where the nerve entered the cord, but nothing at intermediate points. Hayem,† also experimenting on rabbits and dogs, produced a generalized central myelitis by lacerating the sciatic nerves, the irritation following the track of this nerve to the cord. Subsequent researches of M. Hayem ‡ have confirmed and extended these results, which throw light on a considerable number of morbid conditions. I might allude to other observations of this *neuritis migrans*, as it has been named, by Froriep, Rokitansky and Dumenil,

---

* *Ueber Neuritis.* Kœnigsburg, 1860. Quoted by Anstie.

† C. R. Acad. des Sciences and Soc. de Biologie, 1874 and 1875.

‡ See abstract in Periscope of this issue.

and by Feinberg*, who also saw a myelitis produced, but perhaps the most instructive of all are those of Klemm.† This author injected a few drops of Fowler's solution into the sheath of the sciatic nerve of rabbits, thus exciting an inflammation, which was never entirely limited to the point irritated, but sooner or later appeared at other points along the track of the nerve, always affecting those points where one or more arterial twigs entered the nerve trunk, and he also found that the nerve of the opposite side might be involved without any necessary visible affection of the cord or its membranes, through which the irritation must have passed.

These facts illustrate the importance of neuritis as a producer of serious central disease. I have quoted them however to demonstrate the connection between irritation and inflammation of nerves. When we consider how frequently nerves are subjected to more than normal irritations, even without traumatic cause, and if we are to interpret the statements and experiments of Klemm, for example, as indicating that this irritation readily passes into actual inflammation in the more vascular regions of a nerve, we can readily infer that this latter condition may be a not unfrequent accident. The nerve trunks are not, however, absolutely non-vascular: the perineurium and the neurilemma are supplied by a continuous capillary network, and the extension, or even the origination of an acute or chronic inflammation in any part of a nerve trunk is, I think, far from being a pathological rarity.

When the disease is chronic from the beginning, or when, as I believe is more frequently the case, the primary acute lesion is transient and very limited, it may, and often does, pass without recognition. The nerves are often deep-seated and are always masked by the superficial tissues, and the symptoms are easily misunderstood. The only nerve in the body which is open to inspection, the optic nerve, differs in many respects from all the more peripheral nerves, so much so in fact that it has been considered as properly not a nerve at

---

* *Berliner Klin. Wochenschr.* No. —, 1871. Abstracted in *Præger Vierteljahreschr.*

† Inaug. Dissertation, Strasbourg, 1874. Abstracted in *Centralblatt f. d. Med. Wissensch.*, No. 52, 1874.

all in the usual sense, but rather a projection of the general mass of the brain. It is extremely vascular, its fibres lack some peculiarities of investment of nerve fibres in general, and as a whole it is more complex in structure than the peripheral nerves. Still I think we can use it to draw an inference as to the liability of other nerves to inflammation; its conditions are not so dissimilar from theirs except in degree, and its peculiar situation, mainly within the cranium and in close relation with the most important nervous centres therein contained. It seems to me to hold an intermediate position between the cerebral processes and commissures and the peripheral nerves, being like the former to a considerable extent in its structure and vascularity, and like the latter in its appearance and functions. Optic neuritis we know is one of the symptoms most generally observed in intracranial disease, and also as a result of syphilis, albuminuria, epilepsies, etc., and it occurs also in an ascending way from various ocular troubles, besides being a reflex consequence of disorders of other nerves. In fact this nerve seems specially liable to inflammatory change from almost everything that can be imagined as a possible cause. Notwithstanding the differences that exist and which I have mentioned, there still seems to me to be a very considerable analogy between this and the other nerves; and allowing for the difference in the conditions, these facts appear to point that neuritis may be also a frequent occurrence in other parts of the peripheral nervous system.

The clinical facts which point to the probable frequency of neuritis, more especially in its chronic or sub-acute form, are very numerous. If we consider as uncomplicated neuralgias only those cases that are characterized by spontaneous intermittent pain, and are, at least in the beginning, without any local change, a restriction of the term that is made by some, we have then a very large number of cases characterized by tenderness on pressure or contact, often accompanied by true neuralgic pains, but still different as a whole from the former class, and evidently connected with local peripheral disorder, many of which, I believe, depend on an actively irritative, and probably inflammatory trouble of a nerve. The later stages of many central

neuralgias may be complicated to some degree with this condition; there is no *a priori* reason why such an irritation should not occasionally be propagated centrifugally; the fact, however, that the nerves are generally less vascular the greater their distance from the centres, will account, in my opinion, for the greater tendency neuritis has to travel in a centripetal direction. It is certainly fair, nevertheless, to suppose the reverse process does now and then take place; thus we have the centrifugal extension of sciatica reckoned by Todd,* Remak and others as a neuritis; the experiment of Klemm, in which the disorder appeared in the sciatic of the opposed side, already cited, the observations of Cornil † on the condition of the peripheral nerves in old hemiplegias, and many other cases. Of this nature also, it appears to me, is an interesting case of Dr. S. G. Webber, ‡ in which a myelitis ensued from the amputation of the left arm. At the autopsy there was found also a well pronounced neuritis in the right forearm, greater with the distance from the cord; the anterior roots were scarcely affected at all. The history of the case, as far as given, makes no mention of any other than motor symptoms of this condition during life. Dr. Webber conjectures that in this case the neuritis arose independently of the central disease, from overwork and exposure of the only remaining arm. Although this may have had its part in producing or modifying the disorder, I am inclined to consider it as a case of descending neuritis migrans, primarily induced by the spinal affection, as in the experimental case just cited of Klemm.

Again, there not infrequently occur cases of slight paralytic and sensory symptoms, transient or partial in their nature, or readily subsiding under treatment, which it is difficult to place in any category except that of severe irritative or slight inflammatory affections of nerve trunks. Of course it is impossible to verify this diagnosis absolutely, but a careful observation and record of clinical facts in every day practice, would, I

---

* *Cyclopedia of Anat. and Phys.* III. Article, "Nervous System."

† *Gaz. Med. de Paris*, 1864, No. 11.

‡ *Arch. of Sci. and Prac. Medicine*, No. 5, 1873.

think, not only establish their frequency, but also give at least strong presumptive evidence of their nature. The following case is one of the more marked instances of this kind, due, however, to a kind of traumatic cause.

Mr. E., a young man about twenty-seven years of age, carpenter, called complaining of inability to use his right arm. It was held half flexed; pain was produced on the slightest motion, and there were some sensory disturbances, numbness, tingling, etc. in the hand. The cause, as far as known, was pressure on the elbow in bed, with exposure; the patient having first experienced the symptoms on awaking on a cold night and finding his arm uncovered and resting against the side of the bed-rail in such a way as to cause pressure over the ulnar nerve. For some days these symptoms continued, but they gradually improved under care and some slight home treatment, and he was even beginning to be able to do a little work, when a rough hand-shaking brought them all on again, rather worse than before. There was at the time of the patient's calling on us, a well marked ptosis of the right eye, which he stated had first made its appearance with the trouble in his right arm. The only treatment he received from us was one or two hypodermic injections of morphia for relief of pain, electricity, and enforced rest for the arm. Under these measures the arm quickly regained power, and the pain left him, though complete voluntary extension of the limb was still impossible, and force applied for this purpose, and pressure over the nerve was very painful. The patient passed out of our hands, and after a trial of several physicians, and one or two relapses, I believe, his condition as far as the arm is concerned is still the same; he can use it tolerably well, but it cannot be fully extended. The ptosis has almost disappeared; a slight difference, however, still shows itself in the right eye.

The ocular trouble in this case is of interest. I can only account for it at present in a reflex way. It perhaps belongs in the same class with the reflex muscular spasms following nerve injuries mentioned by Weir Mitchell, or the case of facial cramp from cervico-brachial neuritis reported by Remak.* It

---

* *Med. Central-Zeitung*, XXXIII., 41—44, 1864. Abstracted in *Schmidt's Jahrbuecher*.

suggests, however, most strongly the case quoted by Mitchell from the Memoires de la Soc. de Biologie of a soldier in whom ptosis, with paralysis of the arm and various other nervous symptoms, followed the reduction of a dislocation of the humerus.

Carious teeth might be supposed to be not infrequent causes of neuritis, and so, I believe, they are; but the trouble is generally confined to the cavity of the tooth itself. Thus, not infrequently there is found an enlargement of the nerve or its sheath, filling the whole cavity of a decayed tooth, painless except on direct irritation, which is probably due to slow inflammatory action—it might, perhaps, be more properly called a neuroma than evidence of neuritis. It would be rather interesting to find out why irritation of the nerve by strongly irritating and toxic substances, such, for example, as arsenic, used to "kill" the nerve, do not more often set up serious organic mischief beyond the tooth. The fact is, I believe, that the inflammation they excite rarely extends beyond the constriction at the termination of the root. Dental surgery has become in practice so separate from general medicine that its records and literature are not usually familiar to strictly medical men, but it would seem that careful observations in this department might throw additional light on some of these questions.

Another series of commonly-observed conditions which have lately been recognized as depending more or less on actual nerve lesions, generally inflammatory, are various forms of skin diseases, such as lepra, pemphigus, herpes, and zona. In some of these, the first and last named especially, the neuritis has been verified by actual examination of the nerves, and most remarkable alterations discovered. Zona, indeed, if the theory of Baerensprung be accepted, that it depends upon disturbances in the posterior spinal ganglia, is, in cases where actual alterations of nerves exist, a well-marked example of descending or centrifugal neuritis. A recent writer * has queried whether the cutaneous lesions of syphilis have not for their ultimate cause alterations of nerve structure or function.

* Dr. L. D. Bulkley, *Arch. of Neurology and Electrology*, May, 1875.

The question is certainly still an open one as to how often we are to consider these and the cutaneous phenomena observed in other diseases as due to irritative nerve lesions, nor can it well be decided until more thorough investigations have been undertaken and carried out. It is sufficiently certain, however, and it has been anatomically demonstrated, that not only syphilis, but other constitutional diseases, such, for example, as phthisis, diphtheria, typhoid fever, etc., etc., do occasionally produce sub-acute inflammations of nerves, resulting in hypertrophy of connective tissue, degeneration of nerve tubes, etc. The question, nevertheless, remains at present unanswered as to the relative frequency with which these results are produced; it may be inferred, however, from what we know that they are not excessively rare.

There yet remain to be mentioned as possible evidences of sub-acute neuritis very many of the cases of the so-called reflex paralyses, the reflex paraplegias from affections of the urinary organs, the uterus, etc. For instance, Leyden * holds that these reflex paraplegias depend on an ascending neuritis, which, gaining the cord, generates a myelitis, and thus causes the paralysis. He bases himself in this solely on the clinical arguments, anatomical researches having been unsatisfactory. Benedikt † follows him in admitting the force of the argument in certain cases of slow development, in which neuralgic symptoms preceded the paraplegia, but rejects this theory for all cases of rapid onset. Charcot ‡ also considers one class of these affections as due to a lesion of the sacral plexus, caused directly, so to speak, by an extension of the urinary trouble. On the strength of these authorities it may be allowed, I think, that at least sub-acute inflammatory changes of nerves may have something to do with some cases of these paralyses. And when the real mechanism of what we call reflex paralysis

---

* "Ueber Reflexlaehmungen" in *Sammlung Klin. Vortraege*, quoted by Benedikt, and in *Klinik der Rueckenmarks Krankheiten.*

† *Nervenpathologie und Electrotherapie*, p. 365.

‡ *Le Mouvement Medicale*, 1872. Abstracted in *Ann. Med. Psychologiques*, uly, 1874.

is finally made known, their number may be larger than we have any notion of at present.*

Finally, I will only mention the various neuritic disorders that accompany certain nervous affections which implicate the central nervous system, perhaps primarily. In these cases, usually, the central lesions only have been observed, but in a few the peripheral nervous organs have also been subjected to examination. Thus, we have the apparently neuritic alterations of peripheral nerves in chorea, recently investigated by Elischer,† who discovered an increase of connective tissue and blood supply, together with a corresponding decrease in the nerve bundles in the median and sciatic nerves in a case of this disease. Then we have the diseased conditions of the nerve trunks in progressive muscular atrophy, called by Friedreich ‡ *neuritis interstitialis chronica*, which, as we consider the disease as primarily central or myopathic, is to be reckoned as a descending or an ascending neuritis, respectively. The neuritis observed by Friedreich ‖ in cases of locomotor ataxia is also to be mentioned in this connection. Descending neuritis from traumatic injuries to the cord have also been reported by Pierret,§ who observed alterations in the sciatic in a Guinea pig after section of the cord at the second or third lumbar vertebra, and in rabbits after section or compression of the cord, and also neuritic changes in an occipital nerve of a woman, which had undergone compression from a carious vertebra. It is not altogether impossible, and it has some color of clinical evidence, that the tenderness over

---

* Since this paper was written, the first part of the second volume of Leyden's *Klinik der Rueckenmarks Krankheiten* has been received. The fifth and sixth chapters of this book, on secondary spinal affections and the secondary paralyses, and on paralyses from poisoning, respectively, are quite full and suggestive in regard to these points, and contain, moreover, very full references to the literature of the subject.

† *Virchow's Archiv*, LXI., 4, 1874, page 485.

‡ *Ueber progressive Muskelatrophie*, Berlin, 1873.

‖ *Virchow's Archiv*, XXVI., 1863, p. 452.

§ Couyba—" Des troubles Trophiques consecutifs aux lesions traumatiques de la moelle et des nerfs," *Thesis de Paris*, 1871. Obs. I.

Pierret—" Plusicurs cas de neurite parenchymateuse avec details histologiques," *Arch. de Physiol. Norm. et Pathol.*, 1874, pp. 968–972.

the spinous processes in the so-called spinal irritation may be due to a very circumscribed and sub-acute neuritis of the superficial nerve twigs in that locality. If this should be the case, it would afford an inference as to the pathology of the rather obscure collection of symptoms known generally as spinal irritation. This may do as a suggestion—of course, it is purely hypothetical—and if true at all, it may be so for only a very limited number of cases, the symptom in the great majority of instances having perhaps another cause.

Leaving the cerebro-spinal nerves, we find chronic inflammatory changes in the sympathetic fibres and ganglia in very many disorders. Petrow* has investigated very carefully the morbid histological peculiarities of the sympathetic in syphilis, and found hyperplastic formations in the nerve elements and increase of the connective tissue, producing atrophy of the nerve fibres. Lubimoff,† in a more extended series of researches found similar hypertrophy of connective tissue, a proliferation of the connective tissue elements analogous to the *neuritis interstitialis prolifera* of Virchow,‡ pigmentose and fatty degeneration of nerve cells and fibres, and alterations of the vascular apparatus of the ganglia in cases of syphilis, cirrhosis of the liver, diabetes, and pneumonia, and also alterations of the cervical ganglia in acute atrophy of the liver and hydrophobia. The ganglia of the sympathetic are not altogether like the peripheral cerebro-spinal nerve trunks in structure or vascularity, nor are they, perhaps, to be properly compared with them in some respects; that they are liable to inflammation is not to be wondered at. The connecting cords of this system are also liable, and this fact is, it is possible, more to the point. The relations of the sympathetic, as a whole, in a state of disease, to other parts of the nervous system are of the highest importance, and I will allude to them again further on. At the present place these conditions of the sympathetic fibres and ganglia are noticed only as facts bearing on the general question of the possible and not infrequent occurrence of neuritis in all parts of the nervous system.

---

* *Virchow's Archiv*, Bd. LVII., 1, 1873, 121

† *Virchow's Archiv*, LXI., 1, 1 Heft, 1874, p. 145.

‡ *Virchow's Archiv*, LIII., 1871.

In the foregoing pages I have reviewed, in a rather unsystematic manner, it is true, some of the principal facts which seem to me to indicate the greater frequency than is generally admitted of inflammatory affections of peripheral nerves, and especially sub-acute or chronic inflammations. Much more might have been said—the argument is not by any means exhaustive, but to make it so, would exceed the necessary limits of this article. I will refer those who wish the most complete statement of the facts in regard to these affections, from which the argument may be drawn, to the very remarkable monograph of Friedreich, *Ueber progressive Muskelatrophie; ueber wahre und falsche Hypertrophie*, Berlin, 1873, which contains the fullest discussion of the subject in nearly all its bearings that is to be found, I believe, in any language.

In what has been said, the causes and consequences of neuritis have incidentally received considerable mention. I will, therefore, only recapitulate, so to speak, in this place, some of the principal points under these heads.

The principal causes of neuritis are, as might be supposed, the various kinds of traumatisms. In these I include not only wounds, fractures, dislocations, etc., but also tumors, foreign substances, toxic influences, and whatever induces a direct injury to the nerve or its surroundings. Cold even may be considered as a kind of traumatic cause of neuritis; concussions, likewise, though they may produce no obvious tissue change detected at the time. The use of the term idiopathic, in fact, as it is usually employed, only indicates our ignorance of a cause, not our knowledge that there is no direct external agency in the production of disease. It is a reasonable question, indeed, whether it is ever a proper term to use in speaking of inflammations of nerves. In all cases we have irritation, which, in my opinion, must have a cause external to the peripheral nerve trunk which is affected. And this cause may be an influence from without, or one originating in the nervous centres themselves.

Apart from traumatic causes in the broad sense I have given the expression, inflammations of other organs are among the most common causal moments of neuritis. And from what has been said regarding irritation of nerves, its ready trans-

mission to the most distant parts of the nervous system, and its aptitude under favorable circumstances to pass into actual inflammation, it can easily be conceived how, under certain conditions, such a disorder, in any part of the body, may excite a neuritis, possibly in another and very remote part. In complicated diseases, or those affecting the constitution generally, like syphilis, diphtheria, typhus, etc., the occurrence of neuritis is still more readily explained.

It is somewhat difficult to decide in all cases whether a local lesion is a cause or a consequence of neuritis. The relations of the functional activity of the nervous system to that of all the organs of the body are so intimate, and often so reciprocal, that it is often impossible to form a correct opinon in regard to this point. Thus, we have the still mooted questions as to the primary neurotic or myopathic nature of progressive muscular atrophy, which, notwithstanding the admirable discussions and arguments of Friedreich in favor of the latter view, cannot, in my opinion, be regarded as satisfactorily decided. The need here is for more careful clinical observation, based on a preliminary accurate knowledge of the affections of peripheral nerves. The conclusions to which these may lead us, will, perhaps, be that it may be of either central or peripheral origin in different cases. The fact that motor paralysis may ensue without loss of sensibility, while, as a rule, sensibility suffers first, suggests that either function alone may be disordered, or even that the trophic fibres may be the only ones implicated in some neuritic troubles.

The tendency of neuritis to extend itself, especially towards the centres, is, probably, a very important factor in the production of central disease of the nervous system. The experiments of Hayem, Feinberg, and others, have demonstrated that myelitis and meningitis may be produced by an ascending neuritis; the same condition of the nerves has been found by Curling,* Froriep,† Lepelletier,‡ Michaud,‖ in tetanus,

---

* *Treatise on Tetanus*, London, 1836.

† *Froriep's Notizen*, I., 1, 1837.

‡ *Revue Medicale*, IV., 1827, p. 173.

All quoted by Friedreich.

‖ *Arch. de Phys. Norm. et Pathologique*, No. 1, 1872, p. 59.

and the list will doubtless be much extended with further observations. That these results do not always or generally follow the peripheral disease proves nothing; there is no reason, in fact, to think that the disorder of the nerve trunks may not even pass beyond the condition of irritation, or may undergo a spontaneous cure, while it is extending most disastrously in the cord. The fact, that in many, perhaps in a great majority of cases of tetanus the peripheral nerve trouble cannot be detected on examination, points this way, though it has led to the adoption by some of the theory that it is really a blood disease.

The trophic disorders to which neuritis gives rise are in some respects the most striking of all its results. Besides the paralysis and wasting, and the occasional hypertrophy or pseudo-hypertrophy, which may perhaps be reckoned among the consequences, we have numerous lesions of the skin, and it is yet a question how many of the skin disorders are to be attributed to this cause. Couyba * enumerates among the trophic disorders induced by neuritis, erythema and ulcerations, eczema, herpes, pemphigus, ecthyma, alterations of the hair and nails, thickening and desquamation of cuticle, inflammatory lesions of cellular tissue, arthropathies, subluxations and atrophies and pseudo-hypertrophies of muscles, and has collected numerous observations by various authors, very largely from the work of Dr. Weir Mitchell, which illustrate each of these effects. The exact mechanism of the production of all these effects is not clear. Charcot † and Onimus have stated that herpes and some other skin neuroses depend on an irritative or inflammatory process, not a complete paralysis; that it occurs when a nerve is recovering its functions, or perhaps losing them, and the first-named investigator has expressed an opinion that the vaso-motor nerves were connected with this process. Benedikt has noted that the arthropathies do not always affect the joints within the region of supply of the affected nerve, but are sometimes observed in distant articulations.

---

* "Des Troubles Trophiques consecutifs aux lesions traumatiques de la moelle et des nerfs." *Thesis de Paris*, 1871.

* C. R. Soc. de Biologie. *Gaz. Med. de Paris*, No. 24, 1873; *Cbl.*, No. 47, 1873.

The influences of disturbances of function of the sympathetic from inflammation or irritation of its fibres or ganglia have been hinted at already. I need not particularize at any length in regard to these points, but some possibilities may perhaps be suggested. First, intracranial circulatory disorders may arise in some cases in this way so as to produce congestion or anæmia, and such phenomena as migraine, delirium, etc. The favorable therapeutic results of electrization of the sympathetic in many forms of disease, reported by so many authors, would naturally lead to the inference that it was a disorder of the functions of this organ that had to do with the production of the symptoms thus ameliorated. And when we consider the vascularity of the sympathetic ganglia, this theory of the production of disease seems still more probable. In fact the number of disorders which have been reckoned as due to irritation of the sympathetic is by no means inconsiderable. Besides migraine, just mentioned, we have exophthalmic goitre, angina pectoris and various other so-called cardiac neuroses, disorders of accommodation, etc. In many of these, evidences of actual inflammation have been discovered, as for example, in the observations collected and reported by Eulenberg and Guttman* and by Nagel † in the vaso-motor neuroses of the eye.

Perhaps, however, we ought not to limit the morbid action of the sympathetic to the production of special diseases, which in reality are only special evidences of a general condition of disordered circulation. The fact that, as far as we have any certain knowledge, the sole function of the sympathetic is to regulate the circulation, shows the importance of the proper regulation of this function. Any derangement in the blood supply of parts may lead to very important changes which may interpret themselves in these and other forms of disease. These facts should be enough to show how extensive the results of neuritis affecting the sympathetic may be; it would require almost a volume of special pathology to detail the symptoms it may thus secondarily produce.

---

* *Pathologie des Sympathicus.*

† *Klin. Monatsblaetter f. Augenheilkunde*, December, 1873. Abstracted in *Rev. des Sci. Médicales.*

Very similar remarks, though less comprehensive, will apply to the chronic inflammatory alterations of the vagus, instances of which have been reported by various authors, such as Lubimoff,* Guttman and others. The mixed functions of this nerve, sensory-motor and vaso-motor, render the symptoms induced by its derangement exceedingly complex. Perhaps many cases of nervous cough, dyspepsia, vomiting, etc., are rightly to be attributed to it. I offer these simply as suggestions; they are not, all of them, as yet facts of actual observation, so far as I am aware.

A very few words, in addition to what has already been incidentally said, in regard to the prognosis of chronic neuritis will suffice. My opinion that it often undergoes a spontaneous cure has been expressed in the preceding pages; the oversights and the occasional difficulties in diagnosis will, however, prevent our obtaining any reliable statistics on this point. When the disease is well advanced so that its nature is clearly recognizable, and pronounced motor and sensory paralysis with atrophy of muscles have become manifest, the situation is in my opinion not the most promising. In cases where extensive tissue alterations, such as sclerosis, obliteration of nerve fibres and granular degeneration have taken place, not too much is to be anticipated in the way of recovery. And in cases like those described by Dumenil † as *névrite chronique ascendante* and by Jaccoud ‡ as *atrophie nerveuse progressive*, when the disease begins in either the nerve roots or starts in the periphery and ascends to the plexus as in the case we have described, there is nothing more than the relief of symptoms that can reasonably be expected. Still I believe many, even of these cases, recover. The tendency to centripetal propagation is always to be kept in mind, however, and when the disease has gained the plexus it may be considered as fortunate if it does not also involve the cord, producing serious central disease. That this does not always,

* Loc. cit.

† *Gaz. Hebdom.* Nos. 4, 5 and 6, 1866.

‡ *Traite de Pathologie Interne*, I., p. 399, 400. *Atrophie Diffuse des nerfs rachidiens.*

or perhaps even generally occur, may be admitted, but the danger should be always kept in mind in cases like these. On the other hand, when recognized and taken in the start, while still confined to the peripheral portions of the nerves, a very hopeful prognosis may be made. If sciatica is dependent on a neuritis, as I believe is at least not infrequently the case, it certainly would not indicate that the prognosis must invariably be unfavorable. In this disease, however, it seems to me highly probable, that in the majority of cases that are not purely neuralgic, the nerve trouble has not passed beyond the stage of irritation; the disorder consists rather in an irritable state of a peripheral nerve, and the morbid process, if it progresses, may develop either a central irritation producing true neuralgia, or the structural nerve change of chronic neuritis. The fact also, and I believe it to be a fact, that in other parts many cases of actual neuritis misunderstood and maltreated, recover either perfectly or in part, shows that the tendency of this disease is not altogether bad. The practical point in this connection, however, is to have correct ideas of the affection, to be on the watch for and to recognize as such the primary symptoms of inflammatory nerve disorder, and to meet them promptly and properly.

The treatment of chronic neuritis is simple, and may be summed up in a few sentences. Antiphlogistic applications are, of course, indicated, local application of cold over and around the affected nerve, counter-irritation, local blisters, and even leeching and cupping may, in some cases, be of advantage. General treatment should be given on general principles, according to the special character of each case. In all cases rest, as nearly complete as possible, of the part, should be prescribed, and everything that can in any way excite its circulation should be avoided.

The local application of electricity is of all means the one that offers at present the most promise in the treatment of this trouble, and the constant galvanic current is the form from which the best results may generally be expected. In some cases, and one in particular, I have seen excellent results follow the use of the faradic current alone, but usually the constant current is of the most value. It is, I think, most cer-

tainly the safer of the two in this disorder; I have seen, as related in the case given, troublesome symptoms revived under the use of the faradic current for counter-irritation and testing the muscular contractility. The galvanic current, however, in spite of the recommendation it has received from Remak, Benedikt, Erb and others, is not invariably successful in producing a cure, even in cases of the so-called idiopathic neuritis. It is, nevertheless, as far as our present knowledge goes, the one remedy which is always indicated, and from the employment of which the most is to be hoped in this disorder.

In the foregoing pages many points of interest in regard to this subject have been left untouched; I have not discussed the diagnosis of the affection nor described at length its symptoms. For both of these I would refer the American reader to the forthcoming translation of Erb's *Krankheiten des Nervensystems*, the first part of the twelfth volume of Ziemssen's Hand-book of Special Pathology and Therapeutics. The details of the case given, in many respects, though not in all, a typical one, and their discussion following, will serve also to show the general character of the affection. No mention has also been made of certain forms of disease in the pathology of which local neuritis plays no small part, such, for example, as lead paralysis, in which alterations of the radial nerve have been observed by Westphal,* Bernhardt † and others. The main object of the discussion of the subject in this article has been to show the possible, and even probable frequency of the chronic inflammatory affections of peripheral nerves and the practical importance of their recognition and correct treatment. Such diagnoses as of neuralgia or paralysis, as are frequently made in these cases, or the still more vague designation of neurosis applied to the disease or some of its symptoms, not only afford no correct clue to the treatment, but are often positively misleading to the physician.

The following general conclusions seem justified in regard to this affection :

1. Chronic sub-acute inflammatory affections of peripheral nerves occur not only often independently of other diseases,

---

* *Archiv f. Psychiatrie*, IV., 3, 1874. P. —

† *Ibid*, *p*. 776.

but also as frequent and very important factors in the pathology of many general disorders.

2. Many so-called neuralgias and forms of paralysis often referred to central disease, find their true explanation in the recognition of this condition in peripheral nerves. It does not follow that central disease may not co-exist with and secondary to the peripheral disorder; we have seen ptosis accompany sub-acute neuritis of the ulnar nerve from compression and cold, and there is no question that many severe central troubles arise from the centripetal propagation of peripheral neuritis.

3. Neuritis may be a secondary consequence of central disorder, and in these cases it is likely to be overlooked. It may, however, so complicate the symptoms as to mislead the physician and induce him to attribute to serious central lesions that which is simply due to secondary peripheral disorder, thus affecting the correctness, in some points, of his diagnosis.

4. A merely irritative process in a nerve trunk may, and often does, become an actual inflammatory condition in its more vascular tracts. This explains, in my opinion, the greater tendency of those affections to propagate themselves centripetally than towards the periphery; the nerve trunk generally being more vascular as we ascend towards the cord.

5. Notwithstanding the fact that many cases undergo a rapid and even a spontaneous cure, an early recognition of the disease and proper remedial measures are important on account of its tendency, in many cases, to extend itself toward the nervous centres. When the disease has reached the plexuses, it is beyond the reach of active treatment, and the prognosis is not too promising. It may also involve the cord, producing serious and fatal lesions.

6. In the treatment of sub-acute neuritis, the measures which promise the most favorable results are as complete rest as possible for the affected parts and the use of the constant galvanic current. Other means should be employed on general principles, recognizing always the nature of the morbid condition, an irritative or sub-acute inflammatory process, causing, generally, proliferation of connective tissue, and compression and atrophy of nervous elements.

Art. V.—ON PARALYSIS OF THE VAGUS.

By Franz Riegel.

Translated from the Berliner Klin. Wochenschrift, No. 31.

PARALYSIS of the vagus, as we are aware, is one of the rarer diseases in the field of inner medicine, but is at the same time of especial interest on account of the disturbances of function to which it may give rise.

As is generally known, the vagus nerve fulfills widely different functions: it gives out branches for the pharynx and the larynx, which contain at once sensible and motor fibres; further down it distributes branches to the œsophagus, the stomach, the trachea, and the bronchial tubes, and, the most important of all, to the heart, to which organ it stands in the relation of an inhibitory nerve, in opposition to the sympathetic, its excitory nerve. These two nerves are, therefore, antagonized, but in such a way that, normally, each counteracts the other in the condition of the undisturbed action of the heart. On the other hand, the functions of this organ are involved if the activity of either one predominates in its influence on the heart.

It would be superfluous, in this place, to enter into any extended discussion of the relations of the vagus and sympathetic to each other, or to attempt to state the exact action of each on the cardiac activity. In spite of the numerous memoirs on this subject, which have appeared during the last ten years from such men as Von Bezold and his pupils, and from Ludwig, Thiry, Bernstein, Cyon, and others, there are yet many questions relative to these conditions of innervation that require still further research. The pathology of the vagus is still less developed, so that at the present time it can scarcely be said to have any pathology.

As may be readily admitted, the vagus nerve is subject to disease of various kinds in all parts of its course, from its origin in the medulla to its final terminal branches. But it is not very common for it to be affected in its origin in the

brain. And, as in other cases where disease exists in that region, it rarely happens that the vagus is alone involved in central disease so that the symptoms are those of vagus paralysis alone. The cases of this kind, as Guttman * has observed, are almost invariably complicated with irritative and paralytic phenomena—the results of the implication of neighboring parts—so that it is hardly possible to separate the symptoms caused by the paralysis of this nerve with sufficient sharpness. In most cases, also, as Guttman remarks, the paralysis is not so well defined as that produced in animals after section of the pneumogastric in the neck, since in the nerve trunk all of its fibres are united together, while they are spread considerably apart in its central origin. In general, therefore, those cases of brain disease in which certain symptoms point to a co-existing disease of this nerve are little suited for the study of the phenomena produced by paralysis of the vagus, and it is only in rare cases, hitherto, that the co-existence of a severe disorder of the pneumogastric in cases of diseases of the central organs could be determined with certainty. An interesting case of this kind of central vagus paralysis was recently reported by Guttman.† This case is of particular interest, because the symptoms of vagus paralysis were developed at the end of a previously existing diphtheria of the fauces. While it is well known that paralyses of the velum palati are not rare after diphtheria, and motor paresis of the lower extremities is not infrequently observed, this peculiar paralysis of the vagus, after this disease, had not before been noticed. A brief account of a very interesting case, belonging, at least in part, to this category, which I myself had the opportunity of observing, has been recently published by Feith.‡ In this case a paralysis of the velum palati and of the two crico-arytenoidei postici followed a facial erysipelas, and this last-named paralysis rendered the operation of tracheotomy necessary. It is scarcely too much to

* "Zur Kenntniss der Vaguslaehmung beim Menschen," *Virchow's Archiv*, Bd. 59, 1.

† L. c.

‡ "Verhandl. des Allg. Arztl. Vereins in Coln, vom 24 Aug., 1875." *Berliner Klin. Wochenschr.*, 1874, No. 49.

suppose that in this case, also, we have to do with a neuropathic paralysis affecting the recurrent branch of the vagus which supplies these muscles.

In the above-mentioned cases of Guttman, in which, as already shown, the paralysis was to be considered as of central origin, there were still other phenomena, which, without question, had to be referred to a central cause, the most striking symptom being a pronounced dyspnœic respiration, with this special feature, that while the depth of each single respiration was notably increased, their number was perceptibly less than usual.

Leaving the paralyses of the vagus of central origin, and taking up those due to peripheral causes, in which the simple form of vagus paralysis is much more commonly observed, we find, as might be expected, that it is almost always unilateral. According as the seat of the disease is on the one or the other side will the symptoms perceptibly vary, and especially as the original affection which causes that of the vagus is more or less concealed. Most frequently affections of neighboring organs cause the involvement of the nerve, and here the nature, the extension, and the seat of the original disorder notably affect the symptoms. The commonest form, as is well known, is the implication of the recurrent branches of the vagus, and the consequent vocal alteration is rather frequently the only symptom to be referred to this nerve. Thus, Traube first offered the proof that the so frequently met with *vox anserina* in cases of aortic aneurism is to be referred to a paralysis of the left recurrent nerve, in consequence of pressure of the aneurism at the turning point of the nerve near the aortic arch. So, also, in affections of the apex of the right lung or the subclavian artery, the right recurrent nerve is sometimes pressed upon and irritated, and in consequence paralyzed. In like manner, also, may affections of the mediastinum, of the bronchial, of the lateral glands of the neck, of the œsophagus, of the great intrathoracic vessels, lead to paralytic disorder either of the main trunk or the branches of the vagus.

Before I go further into the subject of the different varieties of vagus paralysis and the symptoms they produce, I will

briefly relate the observation which induced this communication, and which seems to me to be of interest in many respects.

The case in question is that of a locksmith, fifty-three years of age, who came on the 24th of March for reception at the inner station. The patient had been in hospital about four weeks of the preceding autumn on account of pain in the chest, but without any other ailment than a moderate bronchitis having been diagnosed, and then he returned to his work for a considerable period. For about five weeks he had been unable to work on account of his chest difficulty. His complaint was now principally of shortness of breath, especially in walking, going up stairs, etc., and of palpitations of the heart and slight cough on every bodily exertion. There was no fever, but on one occasion there was a hæmorrhage.

On his reception he presented the following symptoms: Body very emaciated, skin dry, general appearance highly debilitated, occasionally slight involuntary contractions of certain muscles in both forearms and hands. These contractions first appeared during his twenty-third year, then disappeared entirely, and only made their appearance again during the last two years. Lungs normal, with the exception of the signs of moderate bronchitis. The respiration gave no apparent variation from health. The heart shock was weak, *the cardiac action very greatly quickened*, 164 *beats a minute*, the radial pulse very small, often barely perceptible. The area of cardiac dullness was only slightly enlarged in the transverse direction; the tone was weak, but perfectly pure. The bodily temperature was normal; the abdominal organs showed no alteration.

In relation to the further course of the disease we may here remark that on the next day small areas of dullness developed themselves in the posterior portion of both lungs, and hastened the fatal termination. The sputa, which previously were slimy, became dark reddish black. The heart's action up to the last moment stayed at about the figure given, while the temperature never exceeded the normal, and was commonly below it.

As concerned the diagnosis, nothing could be declared

except the moderate bronchitis. All the other organs were normal. The pulmonary infarctions which were developed as secondary terminal phenomena could not be taken into consideration for the explanation of the general symptoms. Apart from the bronchial trouble, only one symptom was specially striking, the more so since it was constant during the whole duration of the observation — this was *the very noticeable quickening of the pulse, which continued the whole time at the above-named figure.* This quickening of the pulse is the more noteworthy as it was in striking contrast with the bodily temperature, which never exceeded the normal figure, and part of the time was below it.

From the lack of all previous disease, only a neuropathic origin could be ascribed for this remarkable increase of the cardiac activity, and nothing seemed more probable than a paralysis of the vagus. And, in this connection, we would say, in relation to the clinical appearances, that no disorder of the vocal functions beyond a slight feebleness of the voice, was determinable. A laryngoscopic examination was unfortunately impossible during the time the case was in the hospital on account of his collapsed condition. Under the circumstances, perhaps, a laryngoscopic examination might have contributed some aid to the diagnosis.

If, in consideration of the known experimental results of division of the vagus in animals, there can scarcely be any doubt in regard to the diagnosis of vagus paralysis, the explanation of the special cause of this paralysis meets with very considerable and even unsurmountable difficulties. From the lack of any previous morbid symptoms, with the exception of the above-mentioned slight bronchitis and the secondary lung infarctions, every basis for the theory of a cause of this paralysis also fails. The most probable theories were that some intrathoracic tumor, a mediastinal tumor, an aneurism of the aorta, the innominate, or subclavian arteries, a swollen bronchial gland or something of the kind was pressing on one or the other vagus and causing the paralysis. For a moment I thought I had a cause, but closer observation corrected me; the manubrium sterni was a little more curved forward than usual, and caused a very slightly dulled percussion sound, so as

to suggest the possibility of an intrathoracic tumor. The lack of all abnormal auscultatory sounds and all previous pressure symptoms, especially on the side of the great venous trunk, afforded no further support for this supposition, and left the question as to the cause of this paralysis still an open one.

Death soon ensued, and the autopsy gave the following appearances:

In the right pleural cavity about half a litre of turbid reddish fluid. The right lung almost free throughout; the left slightly hypertrophied. In the pericardium some clear yellowish liquid; the heart large; a large tendinous spot on the right ventricle. Both ventricles contained a quantity of dark colored blood clots; both were somewhat dilated and hypertrophied, especially the left one; all the valves were perfectly normal. The left lung well dilatable, only in the lower part of the upper lobe was a very dark reddish, wedge-shaped, four centimetres long, five centimetres wide, nearly solid infarction, projecting above the surrounding surface, and with its point directed inwards. In the right lung almost the whole lower lobes were uniformly infiltrated, and dark reddish in color on the cut surface. In the upper lobe of the right lung was a wide wedge-shaped mass, the base directed outwards, five centimetres long and eight wide, of the same character as the other. The vessels on the borders of these spots were filled with almost coagulated dark red masses, easily broken up. In the left auricles were tolerably consistent coagula, mostly blackish, partly otherwise colored. The larger bronchial glands were generally much enlarged, tolerably compact and perfectly black on their cut surface. The careful preparation of both vagi throughout their full course showed the following:

The left vagus nerve was, just below the point where the recurrent nerve leaves it, so imbedded in such a lymph gland, that it was scarcely possible to separate it. The pigmentation extended from this point to the outermost circumference of the nerve. The nerve itself appeared at this, noticeably narrowed, atrophied and less consistent than usual. Microscopically, the left vagus above this point appeared perfectly normal, the nerve fibres well contoured, and very broad and fair looking; on the contrary at this point the nerve fibres were almost

generally extraordinarily narrow, their contour obliterated, and the fibres disorganized into fatty granules.

The right vagus and recurrent nerves were perfectly intact.

The brain and other organs were without any special alteration.

Reviewing the symptoms during life and comparing them with the results of the anatomical investigation, there can exist no doubt as to the correctness of the *ante-mortem* diagnosis. The pulmonary lesions, as was shown before, were only secondary complications, without any direct connection with the primary disease. On the other hand, the moderately well pronounced hypertrophy of the heart must probably be considered as a direct result of the increased cardiac activity from the paralysis of the vagus.

It may perhaps appear remarkable that the intense dyspnœa, with the special peculiarity of the increased depth of the respirations and their diminished number, so constantly observed after the section of both vagi in animals, failed in our case completely, and that only the increased cardiac activity, also observed in animals, was present. On the contrary, as I have lately repeatedly shown by experiments on animals, it is to be considered that section of one vagus is not sufficient to produce the above described peculiar respiration, while an astonishing quickening of the cardiac pulse has been produced already. In the second place comes the locality of the interruption of function, in regard to which, on account of the numerous anastomoses, no definite rule can as yet be stated. The seat of the trouble in our case readily explains why the recurrent nerve remained uninvolved. In like manner sometimes the pulmonary or bronchial branches, then again those to the œsophagus, the cardiac, the pharyngeal, or the gastric twigs may or may not be implicated. According to the greater or lesser extension of the anatomical alterations, and as the seat of the interruption of conduction is higher or lower in the course of the nerve, will there appear symptoms of disorder, sometimes in one organ, sometimes in others.

Giving now our attention, at the close of our remarks, to the general class to which our case belongs, in order to be able to compare it with other analogous cases, it follows that, if we

exclude those of central origin, we can recognize with Guttman three different forms of vagus paralysis. First we must distinguish those due to pressure from tumors, cicatrices, etc. These forms are relatively the most frequent. Thus aneurisms of the aorta, especially of the aortic arch, and of other large intrathoracic vessels, tumors of the anterior mediastinum, enlargements of the bronchial glands, etc. may cause symptoms indicating trouble with the vagus. But, corresponding to the situation and constitution of the tumor, will the functional disorder be almost always unilateral, scarcely ever bilateral. From the anatomical conditions it is plain that the inferior recurrent laryngeal nerve, one of the most important branches of the vagus, will be the one most frequently involved. The consequences of this disorder of function concern only the organ supplied by this branch, the larynx. Exceptionally, the trouble in question may involve both recurrent nerves; such cases have been reported by Montault, Gaubrick and others. Some cases of this group, in which retarded, deep inspiration and similar symptoms are observed, suggest the idea that both vagi may be implicated. As has been proven by numerous experiments, and as Ziemssen * in particular has clinically demonstrated, the complete bilateral recurrent paralysis causes notable vocal waste of wind, absolute aphonia, impossibility of energetic coughing, and embarrassed expectoration; but scarcely under ordinary conditions does it induce dyspnœa. On the other hand, a lasting dyspnœa is readily explained if we admit a simultaneous implication of both vagi.

But it happens but seldom that tumors of this kind lead to a disturbance of the respiration of the kind characteristic of vagus paralysis. It is true that respiratory troubles are not infrequent from tumors, but they are not generally produced by paralysis of the vagus, but in consequence of constriction and compression of the respiratory organs. It is therefore especially necessary in each case to carefully study the special character of the respiratory trouble in order to distinguish whether it is due to compression or to functional disturbance of the vagus. In still other cases the tumors cause no respir-

---

* *Deutsche Archiv f. Klin. Medicine.*

atory disorder, but disturb the circulation in such a way that the vagus nerve partly loses its regulatory influence on the heart. In these cases, as in the experiment of cutting the nerve in animals, there is produced a very great quickening of the heart's action. Hayem* reports such a case, in which, on account of the presence of a mediastinal tumor, the pulse was constant at 120 to 130 per minute. Our own above reported observation comes nearer to this, except that in our case, in spite of the unilateral character, the rapidity of the cardiac pulse was even more remarkable.

Whether in the earlier stages of this affection irritative symptoms are ever present instead of paralytic ones is not easy to say, on account of the poverty of the literature. Some probability of this is afforded by the experiments of Czermak,† who found that phenomena similar to those produced in animals by electric excitation could also be produced by mechanical pressure on the vagus. Czermak observed that by pressure on his own right carotid he caused a momentary arrest of the heart in diastole, and that then it beat more powerfully, but with diminished and gradually increasing frequency. Quincke ‡ has made the same observation on a large number of persons in good health and otherwise.

To these paralyses of the vagus from the various kinds of tumors we may add those cases in which it or some of its branches have been wounded, either in surgical operations, such as the extirpation of large cervical tumors, or by bullet or punctured wounds. There are many such cases in the literature, such as those reported by Roux, Kappeler, Fano and others.

Much less frequently than either of the above causes do the independent idiopathic disorders of the nerve lead to functional disturbance. Medical literature contains only two such cases, and even these are on many accounts open to criticism.

Returning again, in conclusion, to our case, it was through-

---

* *Arch. de Physiol.*, 1869, p. 651.

† *Jenaische Zeitschr. f. Med. u. Naturwissensch.*, 1865. *Präger Vierteljahrschr.* 1868.

‡ *Berliner Klin. Wochenschr.*, 1875, Nos. 15 and 16.

out noticeable that in it the symptoms on the side of the heart were especially pronounced. As will be readily understood, it is important to arrive at the degree, and especially the seat of the lesion, in order to refer the pathological phenomena of this case to this organ, in another to that organ. Thus in many cases one is not only in condition to diagnose a paralysis of the vagus, but also, indeed, to diagnose the special seat of the functional disorder of the nerve.

Reviews and Bibliographical Notices.

I.—THE DIAGNOSIS OF NERVOUS DISEASES.

I. DIE PHYSIOLOGISCHE DIAGNOSTIK DER NERVENKRANKHEITEN. Versuch einer Feststellung der Leitungs und Zuckungsverhæltnisse im Nervensystem des gesunden und kranken Menschen. Von Dr. G. Burckhardt, Privatdocent der Med. an der Universitaet Basel. Mit Sieben Lithographischen Tafeln. Leipzig: 1875. P. 284. (*The physiological diagnosis of nervous diseases, etc.*)

II. NERVENPATHOLOGIE UND ELEKTROTHERAPIE. Von Dr. Moritz Benedikt, etc. Zweite Auflage der Elektrotherapie. 1 Abtheilung, mit Holzschnitten. Leipzig: 1874. P. 395. (*Nerve-pathology and electro-therapeutics, etc.*)

III. ERKRANKUNG DER INNERN KAPSEL. Ein Beitrag zur Diagnose der Heederkrankungen. Von Dr. C. Wernicke, etc. Breslau: 1875. Pages 24. (*Disorders of the inner capsule, etc.*)

One of the most important among the advances in our knowledge of diseases of the nervous system consists in an increased refinement in their diagnosis. Not only can diseases be distinguished from each other that were formerly confounded, but it is now becoming possible in many cases to lôcate with considerable accuracy their organic seat. The process by which this is done is mainly inferential. In diagnosing diseases, for example, of the heart or lungs, it is possible to hear them act, and to apply tests which far outnumber those that can be applied to the central nervous system. Shut up, as it is, in great part within an air-tight bony case, it is impossible to directly observe any of its phenomena. Its states can be *inferred* only from the remote effects which its disorders produce, either in the body, of which it forms a part, or in the action of the mind, with which it stands so intimately connected during the life of the individual. In cases of disease of the nervous system, producing morbid phenomena in the motor, sensorial or intellectual spheres, its organic seat can be determined in one or both of two ways : Either by a careful examination after death, or by a thorough knowledge of the anatomy and physiology of the nervous system, which should teach in a more or less perfect manner what are the different parts of the nervous system and

their peculiar functions. In respect to no other part of the body is it so necessary to have a knowledge as exhaustive as possible, of its actual structure and functions, as it is in respect to the nervous system in order to understand its diseases. And for want of this knowledge it happens that the majority of physicians feel baffled and in a measure helpless in their presence.

The first step to be taken in clinical experience is to ascertain clearly what is the nature of the disease, its *location*, *extent* and *character*, as an indispensable preliminary to any trustworthy declarations in respect to prognosis and rational treatment. Within the past few years great progress has been made in this relation, as may be seen by any one who will carefully read the works of Romberg, Hasse, Charcot, Eulenburg, Rosenthal, Brown-Sequard, Vulpian, Luys, Meynert, Huguenin, Erb, Benedikt and Hughlings Jackson, not to mention a host of others, including honored names in our own country. No other department of diagnosis, is at present, so full of promise for the future, and confessedly none is so difficult. We look, in the not distant future, for such refinement in the diagnosis and localization of nervous diseases as will enable the skillful physician to determine, with certainty, the nature and locality of most lesions of the nervous system; but this will be largely accomplished through a more perfect acquaintance with its healthy as well as morbid anatomy and physiology.

In this paper it is not our purpose to treat this subject at length, but to throw together and comment on a few recent works from which may be extracted some useful hints under the title we have chosen. We could easily have extended the list indefinitely, but have selected almost at random the three works, the titles of which are given above.

The first is professedly devoted to the subject in hand, or a certain phase of it, and one, the methods proposed in which are, to a certain extent, recondite and new, so far as their application to morbid conditions is concerned. It contains the results of an elaborate attempt to determine the laws of nerve conduction, both sensory and motor, with a view to their application in the domain of nerve pathology. Hence its title, the "Physiological Diagnosis of Nervous Diseases."

The first chapter is on the "velocity of the physiological conduction in peripheral and central nerve tracts." Hence it is necessary to refer to the various contrivances that have been employed for estimating the velocity with which nervous impulses are carried along nerve fibres—such as the *myographions* of Helmholtz, DuBois Reymond, Marey, Aeby, Schelske and others, including an instrument by our author, which is figured in the first of the plates at the close of the volume. But we do not think, in the absence of illustrative drawings, it would be useful to our readers to describe Dr. Burckhardt's instruments, which, like all similar ones, are complicated and delicate. Our purpose is rather to describe results and their applications in pathology

The second chapter is occupied with the *method* (Methodik) of procedure in the use of the instruments. The methods of Helmholtz, Schelske, Hirsch, Kolrausch, De Jaager, Wittich, Hankel, Donders and others, are canvassed. They used mostly the sensory nerves. Schelske, for example, employed the skin of the foot, of the loins and of the neck, in either case producing a distinct sense impression on the skin of the part and then estimating the period of time which would elapse between making the actual impression and that of perceiving it in the brain. It was held that it would require a longer time for a sense impression to travel from the foot to the centre of perception than from the neck, for a manifest reason. Such was found to be the fact.

The time of making the actual impression (which was generally produced by an induction machine), was registered by means of a delicate "clock-work" instrument, and the time of feeling the sense impression by the subject was signaled by a pressure of the finger on a part of the same registering mechanism, and in this way was a difference noted. But it is necessary to abstract from this aggregate period the time required by the motor impulse to travel from the will centre in the brain to the muscles by which the fingers were moved, by which the second registration was made. This has been done by exciting a motor nerve, such as the sciatic for example, and registering the time of excitation, and then noting the time of the resulting contraction. In this way an approximate rate of transmission of the motor impulse has been reached for a given length of nerve. By measuring the length of the motor conducting tract from the brain to the muscles of the arm and hand, and thus ascertaining the distance,—the rate of transmission per second having been previously determined,—the rapidity of transmission of the sense impression could be rudely determined by abstracting from the gross time that required for the transmission of the above described motor impulse. This same method has been applied to the special senses, and an attempt has been made—and with some success—to establish an average normal rate of transmission of sensory and motor impulses.

The method of Dr. Burckhardt, unlike that of the majority of other observers, who attached their contrivances to one of the tendons of the muscle operated on, and which, by reason of shortening of the muscle, moved the apparatus, is peculiar in that he has availed himself of the *swelling* of the muscle, which not only accompanies, but in a sense precedes the shortening. This refinement in method has the advantage of eliminating the time which elapses between the beginning of the swelling and the occurrence of the shortening. His apparatus for registering the muscular action indicates in their order in time, first, what is called the "swelling curve," and secondly, the "shortening curve." There is an appreciable interval between these, and Dr. Burckhardt seems to have been the first to point it out. Of course the moment the belly of the muscle begins to swell under an excitation from its

motor nerves, it is to be held that the nerve impulse has reached it, without any reference to the subsequent shortening, which latter is to be eliminated. But to go no farther with this description, such is an outline of the method of our author for determining the velocity of the motor nerve current. This method, however, of observing the "swelling curve," cannot be, as the author observes, applied to such muscles as the flat ones, or those deep in the neck, or beneath the scapulæ, or that lie within the pelvis, such as the psoas magnus, and iliacus internus.

Then follow several illustrative examples, and a full discussion of the sources of error as they lie either in the apparatus, the subject of the experiment, or the observer.

Next in order we have a series of 11 cases, comprising healthy persons, upon which measurements were made of the velocity of spontaneous nerve conduction for the peripheral nerves, the spinal cord, and the brain. We can only give the main results.

The velocity of peripheral motor conduction for the sciatic, the crural and brachial nerves was much the same in all: perhaps an average of 28 metres per second, or 91 feet. This does not differ materially from the results of earlier, and perhaps on account of excluding some minute sources of error, is nearer the truth than are the results of former observers. For the spinal cord the main result arrived at was about 11 metres per second, or nearly 36 feet, while for cerebral conduction, the distance being indeterminate, about three-twentieths of a second is given, on the basis that the views of Hitzig and Ferrier are correct as to the location of voluntary motor centres in the cerebral cortex.

The conduction of sensory impressions was found to be much more rapid, or at an average of about 46 metres, or about 149 feet in a second. The rate of spinal and cerebral conduction was much less than this figure, especialy the latter. The chapters in which the above results are set forth are then succeeded by a pretty full discussion of the intimate structure of the cord in so far as it relates to the question of its conductibility. But we cannot in this notice profitably follow our author into the anatomical and physiological details under this head.

The question is next examined as to why the nervous impulse is conveyed along a motor nerve fibre only at the rate of 91 or 92 feet in a second of time, while a sensory nerve fibre conveys it 149 or 150 feet in the same length of time. Upon what does this difference depend? Does it imply a difference in structure of the two kinds of fibres, or is it dependent on peculiarities of structure in the peripheral apparatuses in the two cases? As regards the first question, we have no sufficient grounds, anatomical or physiological, for an answer. There would indeed appear to be many reasons for supposing that the sensory and motor nerves have the same structure. Some of these reasons are hinted at by Dr. Burckhardt. We cannot tarry to mention them now. But for our own part, we do not find it necessary to admit the rate of transmission of nervous impulses is different in the two kinds of

nerve fibres. The difference may be apparent and not real, and lies, probably, in the character of the terminal apparatuses of these nerve fibres. It is probable that those at the ends of the sensory fibres are set in action more promptly than are those —such as muscle—which are at the peripheral terminations of the motor nerves. At any rate this mode of explaining the difference has not attracted the attention it deserves.

The next chapter is occupied with an account of cerebral conduction, which is lengthy and in a general way interesting. But inasmuch as many of the views arrived at are still questionable, and are not to the same degree practical as the results recorded in other parts of the book, we will pass it by for the present.

This concludes the first part of the work. The second part, from page 101 to 144, is devoted to a consideration of "The Laws of Muscular Contraction." Under this head mention is first made of the laws of electrotonus as declared by Pflueger. But they have been so often stated in recent works on electricity in its applications in medicine that it will not be necessary to state them here, especially when it is remembered that they have no very immediate practical relations.

Though this second part is carefully treated, it is interesting chiefly in a technical, rather than a practical way. He appears to adopt in the main the formulæ of Brenner and of Erb in relation to the conditions on which muscular contractions depend when stimulated by the electrical current. We may perhaps present his results best in the following manner: He used in his investigations a Siemens & Halske (Berlin) battery, furnished with their rheostat for measuring increments of resistance. The peroneal nerve for example being selected, he found the "normal curve" to be limited downward in the scale, by 10 elements with 20 resistances (Ka. S.—Z.), and upward by 20 elements with 100 resistances. Anywhere within these limits, if a contraction is elicited in the peronæus, the condition is considered normal. But if a current from less than 10 elements with 20 resistances (Ka. S.—Z.) provokes a contraction, or if it requires more than 20 elements with 100 resistances, the case is considered abnormal.

The third part of the work is devoted to the application of the method, to which reference has been made, to pathology.

After a few introductory remarks, our author recites a number of cases in which his principles were applied. The first consists of 13 cases of "writer's cramp." In some of the cases rapidity in nerve conduction was increased, and in others diminished. In the cases of this disease examined, Dr. Burckhardt found that the different nerves from the brachial plexus proceeding to the affected member had widely different rates of transmission in the same member of the same patient. He also found the electro-muscular excitability, especially of the interossei muscles to differ in the different muscles of the same hand. In some cases the contraction formula (Brenner's) was Ka. Ö.—Z., while in others it was A. Ö.—Z. So to paraphrase these results, if an impulse

should be started from the volitional centre in the brain toward the hand, it would happen in the cases of "writer's cramp" investigated, that the motor impulses would arrive at their respective muscles much sooner by some of the nerves than by others of equal length, and hence, the muscles to which they are distributed would not act harmoniously. But not only would a lack of co-ordinate action arise from the state of the motor nerves of the diseased member, but in a sense independently of this, on account of the various states of individual muscles in relation to nervous as well as to galvanic excitation. Where the rate of conduction of a motor nerve is diminished there is found to be diminished galvanic excitability in the corresponding muscle.

It would be interesting to go at length with our author into the elaborate analysis he has made of the cases under consideration, but our space will not permit this. As to what we are to conclude as to the morbid changes on which the abnormal phenomena in the muscles and nerves depend, Dr. Burckhardt does not himself offer a clear opinion, but adopts apparently that of Hasse, who believes the morbid state may be either central or peripheral, direct or reflex, mental or physical in its origin. As a therapeutic agent, his experience has led him to rely mostly on calabar bean.

The next chapter is devoted to a relation of the results of his diagnostic methods, applied to "myelitis and related conditions," such as sclerosis, meningeal hæmorrhage, hyperæmia of the cord, apoplexia spinalis, tabes, hysteria, meningitis convexitatis cerebri, and certain assumed peripheral neuroses, such as paralyses, neuralgias, etc. But it would be impossible in this notice to detail the results arrived at under each head without extending this notice to an inordinate length. For such details we must refer our readers to the work itself.

The volume is closed by chapters on the "Diagnostic Significance of Nerve Conduction" and the "Diagnostic Value of Contraction-reactions."

The method of Dr. Burckhardt is useful in two ways: First, by enabling the clinical observer to detect the presence of degrees—if not kinds—of disorder that could probably not be detected so soon or so easily by any other method; and secondly, in aiding the observer to fix the location of nervous lesions. For example, if upon examination it should be found that a certain affected muscle preserves its electro-muscular contractility within healthy limits, and that the rate of conduction of the related motor nerves is normal, and also the rate of spinal conduction, the localization of the disorder would be central. But our readers will be able for themselves to see how it might be useful in aiding to locate the seat of lesions, as they exist in the spinal cord or peripheral nerves. But we confess ourselves unable to do more than call attention to the somewhat novel methods of diagnosis described in Dr. Burckhardt's work. To give a critical and satisfactory analysis of the whole work would

be impossible within the limits of an ordinary book review. We would not however have been deterred from such a notice if the methods described were of such kind that they could be generally applied in practice. As it is, they are so complicated and require such scrupulous care in the choice and use of instruments, and in avoiding the various sources of error into which the observer is liable to fall, that we feel our space can be better filled with other matter. But to such members of the profession as are in control of hospitals for the treatment of nervous diseases, or in the case of those engaged in special private practice, who desire to apply the more exact and delicate methods for the detection of nervous disease, and especially in the case of those who are charged with the duty of examining cases for medico-legal purposes, in which there is a possibility of malingering or pretence, this work of Dr. Burckhardt's will prove useful.

In the introductory chapter to Benedikt's work, is a statement of certain "diagnostic laws" in the domain of nervous diseases. These so-called "laws" it would be impossible to maintain as such, in every case. even in the present state of the anatomy and physiological pathology of the nervous system. But inasmuch as many of them are highly suggestive and useful, we will present them *verbatim*. To discuss articulately their merits would occupy more time and space than we can afford in this paper. They are divided into two kinds: *localization* and *diffusion* laws. According to Benedikt we may lay down the following under the head of localization:

1. "Paraplegias that are developed in a simultaneous and symmetrical way imply disorder of the anterior half of the spinal cord.

2. "Cerebral paraplegias arise clearly from two distinct hemiplegias.

3. "Characteristic tabetic symptoms imply disorder of the posterior half of the spinal cord, while spinal muscular 'contractures' and spinal epilepsy are usually connected with disorders of the lateral columns of the cord.

4. "Progressive muscular atrophy implies disorder of the gray substance of the spinal cord in the neighborhood of the central canal, or at all events, diffuse disorder of the anterior roots, etc." Benedikt adds, under the statement of this law, the following: "In a special chapter I will enter on a more particular discussion of the symptoms arising from disease of the central portion of the cord. In that place I hope to show that the doctrine recently announced, that progressive muscular atrophy is primarily a myositis, is clinically untenable, and at the same time I hope to show that not the great motor cells, but other cells of the gray substance are the true trophic cells of the cord."

5. "Hemiplegias with crossed hemianæsthesia, signify disorder of one lateral half of the spinal cord.

6. "Bilateral 'tabetiform' neuralgia of the legs or arms, implies, in central neuralgias, especially, disorder at the point of

entrance of the root into the posterior column, and preferably (praecipue) of the most inner radiating fibres. (Charcot.) It is superfluous to declare that neuralgic conditions simultaneously affecting both extremities—upper and lower—imply affections of the brain.

7. "Progressive paralysis of the cerebral nerves indicates a more or less diffuse disorder in the region of the nucleus of the affected nerves, particularly on account of chronic basilar meningitis.

8. "Paraplegia of the tongue (alalia) and paralysis of the muscles of swallowing, imply disorder at the level of the nuclei for the hypoglossal and glosso-pharyngeal nerves.

9. "Hemiplegias with crossed facial, or oculo-motor paralyses indicate disorder of the fibres of the pyramids at the level of the respective nuclei or at the point of exit of the respective nerves.

10. "Hemiplegias with hemianæsthesia of the same side, imply disorder in the course of the fibres of the pyramid, from that height in the medulla oblongata at which crossing of the sensitive fibres is completed, up to the point of entrance of the outer bundle of fibres of the crura cerebri, into the white substances of the hemispheres, behind the nucleus lenticularis (a gray mass lying external to the corpus striatum, in the substance of the hemisphere).

11. "Hemiplegias with incomplete facial paralysis (especially when the superior branches of the facial remain free) indicate disorder of the motor central ganglia of the brain.

12. "Hemiplegias with convulsions imply disorder of the central ganglia, either in the (stabkranzfaserung) radiant crown of Reil, or in the hemispheres themselves. Disorders of the hemispheres never produce paralyses without being introduced or accompanied by convulsions.

13. "*Aphasia associatoria*, i. e., disorders of speech, in which the mobility of the tongue is preserved, with loss of speech, imply disorders in the region of the *vormauer* (a gray mass lying beneath the cortex of the island of Reil and external to the nucleus lenticularis), which includes in its posterior part, according to Betz, a central ganglion for the hypoglossal nerve.

14. "Hemiplegias with convulsions and *aphasia associatoria* indicate disorders of the frontal lobes in the neighborhood of the Sylvian fissure.

15. "Hemiplegias with convulsions and *neuro-retinitis bilateralis* indicates a disorder of the hemisphere near the thalamus opticus, or at any rate, near the corpora quadrigemina.

16. "Cerebral convulsions without paralytic phenomena are to be referred to disorder of the posterior cerebral lobes.

17. "Psychical symptoms always imply primary or secondary disorders of the hemispheres or their investing membranes. Motor-psychical disorders and mania are to be located in a general way in the anterior half of the brain; emotional disorders in the posterior half. (Schroeder v. der Kolk.)

18. "Statical vertigo (viz., turning to one side about the axis of the body) is in its widest sense, a cerebellar symptom, especially of those portions which connect it with the crura cerebri and parts immediately connected therewith. (Hirnstamm.)

19. "Motor irritative phenomena in disorders of the central nervous system are not independent symptoms of the motor nervous system in the sense these words had in the usage of Bell, but are generally connected with disorders of juxtaposed nervous organs, such as the posterior columns, the lateral columns, the cerebellum or of the hemispheres, in the widest sense of the word.

20. "The influence of irritation of the sensorium, on motor irritative phenomena and motor pathological phenomena, does not usually prove that these symptoms have a cerebral origin, but motor irritative phenomena are more generally produced through irritation, or at least the co-operation of sensitive parts of the nervous system. It is generally to be noted that a great group of motor disorders are not produced through disorder of the motor tract, in Bell's sense of the words, but by means of disorders of parts of the nervous system that are grouped about and closely related to the motor tract."

Subjoined to the statements of this law are some highly suggestive remarks on the functions of the cerebellum and on the bearings of the earlier experiments of Fritsch and Hitzig. But we do not have the time and space to present them in this notice.

In the location of certain peculiar morbid associated movements, as in *chorea major*, he would attribute them to disorder of the central motor ganglia, basing his views partly on the supposed discovery of Betz, of Kiew, that the central ganglia, the thalami optici, the corpora quadrigemina, the corpora striata, the nucleus lenticularis, the *vormauer*, etc., form a connected gray mass, "from whence we may conclude," says Benedikt, "that this whole mass performs analogous functions, and that it is in general the centre for associated movements." Besides admitting the nucleus of the hypoglossus to have the location that has been ascribed to it above, he would reckon the corpora quadrigemina as the co-ordination centres for the muscles of the eyes. But this does not appear to agree with the results of the more recent experiments of Ferrier, who would place, with a certain degree of probabilility, this centre in the cerebellum. The tendency so marked to-day toward the localization of nervous disorders, and which has pervaded neuro-pathology from the days of Bell and Romberg, is pointed out by our author. But in the face of this he would call attention to the necessity of also maintaining the opposite view, or that of the diffusion of nervous disease, for the sake of preserving a due balance in our knowledge of pathological nervous states. As an example he cites dementia paralytica, the organic seat of which, according to Meynert, is the frontal lobes, while Westphal, to the contrary, considered it to depend on disease of the spinal cord. But Benedikt would make it a general

disease of the gray central matter of the whole cerebro-spinal axis. In view of the fact that organic nervous diseases may spread—or be diffused—widely from one part to others, he would explain the multiform symptoms that arise in different cases of sclerosis (*en plaques*) affecting the brain and cord. He adopts, in fact, the views of Charcot and Bourneville, that between the sclerosed spots the apparently healthy nervous tissue is the seat of a diffuse disorder. In this connection the valuable but not novel observation is made that our modes of preparation and of study of the nervous system, after death, are such as in most cases to lead the observer to overlook many probable seats of lesion. This observation, much of a truism as it may be, is so important on some accounts as to make it necessary to call attention to it with emphasis. It is our deliberate opinion that the majority of the cases of post-mortem examinations that have been, or are being made, are, for the purposes of precise study or reliable induction, in great measure worthless. This truth cannot be too strongly insisted on in the case of those who are engaged in studying the records of the pathological anatomy of the nervous system, especially of the spinal cord and brain, and in the case of those whose duty or privilege it may be to conduct post-mortem examinations directed toward this important part of the body.

Basedow's disease he is strongly inclined to locate in the transition region between the medulla and the spinal cord. He also notices under the head of diffusion that in organic affections of the spinal cord, the tendency is to extend in a longitudinal rather than a transverse direction.

Dr. Benedikt insists on the existence and importance of *central neuritis.* According to him it is a frequent morbid condition of the cord, and affords in its liability to extension one of the best exemplifications of the law of diffusion of morbid changes in the central nervous system. As a therapeutical instance of the diffusion of influences through the central nervous system, Dr. Benedikt mentions the effect of the galvanic current on the brain, in the removal of morbid psychical symptoms, when it is directed on the spinal cord. But he admits this case can be explained by a reference to the vaso-motor centres for the head situated in the cervical portion of the cord, the channels of influence from this point being the vaso-motor nerves, the improvement in brain symptoms depending on changes in its vascularity.

The above quotations and references include the more important diagnostic hints that are contained in the introduction to Benedikt's work. Others more or less valuable and suggestive are to be found profusely scattered through the *special* part, which amply repays perusal; but we do not have space to present them in this article. The second division of the work has not come to our hand as yet, but when it does we may find opportunity to notice this part *in extenso.*

Dr. Benedikt writes in an animated polemical style, and is

somewhat daring in his suggestions—and withal speculative—and the impression gained in reading his work has not been the most favorable to his caution in advancing new views, or to a sense of reliance on his ability to maintain a strict balance as between ill-considered progress and a halting conservatism. But for *suggestiveness* we hardly know of any recent work in the department of neurological medicine that can compare with it.

This very clear and instructive little monograph of Dr. Wernicke contains a careful account of a case of hemiplegia, without participation of the face muscles or those of the tongue, or any marked derangement of general sensibility on either side, and without the muscles of the trunk being involved, and with normal cardiac and respiratory action. The question arose as to the seat of the lesion. Our author, after a few introductory remarks on the anatomical arrangement of parts in the medulla, pons, crura cerebri and brain, and a history of the case, gives a most interesting account of his process of analytical reasoning, by which he was led to localize the lesion in the "inner capsule." As to the location of this "capsule" we will permit the author to speak for himself. We translate the above mentioned account in this place because it not only contains much valuable information, but because it shows by example in part the proper mode of diagnosing disorders of the central nervous system.

"Almost all hemiplegias of sudden onset have the following three cardinal symptoms: (1) Predominance of the paralysis of the upper extremity; (2) participation of the oral muscles, and (3) implication of the tongue. The constancy of these symptoms is insisted upon by Meynert, and attention directed to the fact that this combination is characteristic of an affection of the nucleus lenticularis.

"In fact nearly all apoplexies and patches of softening involve the nucleus lenticularis, with more or less participation of other organs.

"In the preceding case these symptoms absolutely failed. While in an ordinary hemiplegia, even if in the beginning both extremities are alike affected, the improvement is always first manifest and most pronounced in the lower extremity, while the upper either continues paralyzed or is noticeably more backward in its recovery than the other. Here the conditions were exactly reversed. The lower extremity remained perfectly paralyzed during the whole three months, while the upper had perceptibly improved the first week. The oral muscles were not at all implicated, the tongue was projected straight forward and exhibited its normal motility, and in speech showed not the least embarrassment of its functions. These variations from the usual type permitted us to conjecture, with much reason, that the seat of the affection was not the usual one, that we did not have to deal with an affection of the nucleus lenticularis.

"Still another fact of this case makes the presence of any affection of the nucleus lenticularis in the highest degree improbable: that is, the very extensive paralysis of both upper and lower extremities. Such a complete paralysis may accompany disorder of this part, but only when the lesion is of extraordinary dimensions. Still other symptoms contra-indicate any such unusually extensive lesion.

"The lack of any apoplectic seizure must be taken as evidence that in spite of the very extensive paralysis of both extremities, the dimensions of the lesion must be very insignificant, even more so than in ordinary hemiplegias. On account of this peculiar symptom, paradoxical in that with so extensive disorder of motility no large lesion could certainly be present, the question must be answered whether in this case we have a genuine local disease or nothing more than one of those rare cases of hysterical hemiplegia, which at present have to be considered as purely functional diseases of the central organs. The commonly met with severe implication of the lower extremities in hysterical hemiplegia (Briquet), the varying emotional condition of the patient, her perpetual complaints and desires, gave some color to this objection.

"Fortunately the hysterical hemiplegias possess some peculiarities which allow them to be easily distinguished from the majority of the other cerebral hemiplegias, and especially from ours. In hysterical hemiplegia the sensibility is always involved, and as Charcot has demonstrated, in a very peculiar way. They come on suddenly, with severe cerebral phenomena, such as coma, convulsions or somnolence, lasting the whole day. The paralyzed limbs show an inclination to a certain kind of contracture, they have the normal muscular irritability (Duchenne). Other indications of previous hysteria are always present. Here, according to the history given, this was not the case. Finally, the age of the patient afforded a very positive objection to the theory of hysterical paralysis, since if no serious hysterical disorder had previously existed it would surely not originate in this age.

"A palpable lesion must therefore be present; the question only remains, where must it be looked for.

"From reasons already given, we have taken it for granted that the lesion must needs be a small one. This must not be sought for in a central direction from the nucleus lenticularis, for the fibres from this body diverge toward the cortex, and a much more extensive lesion in that direction would be needed to explain the symptoms. Another fact speaks against a more central location of the lesion: one already advanced against the seat of the lesion in the nucleus lenticularis, namely, the early diminution of the electric irritability of the paralyzed muscles. All authors since Marshall Hall agree in the opinion that in cerebral paralysis the paralyzed muscles retain a normal or even a heightened faradic irritability for a year or more. Local lesions

of the cortex are almost always accompanied with convulsions and severe, though perhaps transient, disorders of the intelligence. The paralyses starting from the cortex have, moreover, a variable, oscillating character; they may be relieved by the vicarious action of other parts (especially of the other hemisphere) of the brain.

"All these considerations speak against the theory that the lesions may be located centralwards from the nucleus lenticularis or even in the cortex. We are therefore necessitated to look for it peripherally from the central ganglia towards the spinal cord.

"First looking as low as the spinal cord, it has been demonstrated by Brown-Sequard that it is possible to produce experimentally a spinal hemiplegia by a unilateral lesion of the cervical cord. The lack of implication of the cerebral nerves and the diminished faradic irritability would find a ready explanation by this theory. But spinal hemiplegia has a diagnostic symptom that is lacking in this case, that is a crossed hemianæsthesia. On this ground the theory of a spinal hemiplegia must be rejected in our case. Passing higher up, the medulla, the source of so many nerves, must be ruled out, for our case is notable for the absence of any paralysis of cerebral nerves.

"The same is true, though to a lesser degree, also for the pons. A consideration of two points enables us to exclude with very great show of probability, the theory of a very small lesion in the pyramids without contact with the origin of any nerves. Pathological processes in the pons generally are attended with notable disorder of the intelligence (stupor or dementia), and further, if they set in suddenly they always present very striking initial symptoms.

"Lesions of the crus seldom occur without implication of the motor oculi nerve, as will be readily understood when it is remembered that the single radical bundles do not pass directly downwards in the middle line, but in a decided curve, with the convexity directed outwards. The ocular paralysis is therefore on the opposite side to the hemiplegia. Although this condition is the rule in this lesion, there are exceptions, and such a one may exist in this case. The motor oculi may be uninvolved only when the lesion is principally located in the middle and outer portion of the basis cruris cerebri, since the third nerve arises on its inner side. But implication of the outer fibres of the crus is accompanied (according to Meynert) with anæsthesia. In the few cases, also, of local lesion of the crus without paralysis of the motor oculi that appear in literature, the motor hemiplegia was accompanied with hemianæsthesia. Nevertheless the theory that a very limited lesion of only the middle of the basis cruris cerebri existed, is not excluded, especially since it affords an easy explanation of all the remarkable features in our case. The onset of the hemiplegia without any apoplectic loss of consciousness cannot invalidate it, since so small a lesion as it would have to be, would not produce general pressure symptoms, and

the crus does not appear to exercise, like the pons, any special influence on the cerebral vessels. The absence of paralysis of cerebral nerves, especially of the facial and hypoglossus, would be due to their non-connection with the most central portion of the crus. The decided paralysis of the lower extremity seems to be a natural result of the close contact and pressure of the masses of motor fibres. Finally, the electro-muscular condition of the paralyzed limbs is in agreement with the observations of certain authors, and especially does it find in the projection theory of Meynert, according to which the basis, the pyramids and the lateral columns of the cord (the second member of the projection system) form a connected nervous route, a satisfactory explanation.

"Still another location, less circumscribed, for the lesion, has much more probability, since experimentally it can be separately injured, and it fulfills all the conditions of this case. This is not the first process of the basis cruris cerebri surrounded by the optic tract, since disease in this part could hardly occur without implication of the opticus, either in the form of atrophy or neuro-retinitis. Besides this, the basis cruris here is mixed with sensory fibres. On the other hand the inner capsule, the further extension of the basis anteriorly, is the locality fitted to bring about all the symptoms of our case. The inner capsule contains the fibres of the basis extended over a wider space; a lesion here can have a greater dimension to produce the symptoms than one in the crus itself, which must be very small and unusually sharply defined. The absence of paralysis of the facial and hypoglossal nerves would here be naturally looked for.

"Similar signification as to the inner capsule must be given to those fibres which after they have passed the nucleus lenticularis join and form its first (innermost) member. The diagnosis must also include this mass of fibres of small dimensions."

We have not reproduced in our translation the notes with which the author fortifies his statements and which are only less instructive than the substance of his remarks. Our space forbids their insertion in this notice, valuable as they are. The whole discussion is an excellent example of the application of the improved methods of diagnosis in nervous disease, which we hope will become universal in the good time coming when medicine, as practiced throughout the world, is to be a science in fact, and not one merely in name. It is hardly necessary to state that Dr. Wernicke's diagnosis during life was exactly verified by the autopsy, death being the almost inevitable consequence of such a lesion. We commend the discussion of the case to our readers as a model of its kind.

II.—FOX: THE PATHOLOGICAL ANATOMY OF THE NERVOUS CENTRES.

THE PATHOLOGICAL ANATOMY OF THE NERVOUS CENTRES. By Edward Long Fox, M. D., F. R. C. P., etc. With Illustrations. 8vo., 401 pp. London: 1874.

This handsome volume contains or is made up of fourteen lectures delivered either in the coursé on pathological anatomy at the Bristol (Eng.) Medical School, or as clinical lectures at the Bristol Royal Infirmary. The design in thus bringing them together in book form, as the author modestly states, was to present in a convenient shape the scattered pathological facts in publications of various kinds in regard to the diseases of the nerve centres, adding to them at the same time some of the results of his own experience. In this way he has produced a work which, notwithstanding its defects, for which he makes apology, will be found useful and valuable to the student of this class of diseases. No work of this kind can be complete which has for its scope the whole range of the pathology of the nervous centres, and this is no exception to the rule that in such a work its omissions must be necessarily almost as prominent as its merits. It is, indeed, to this fact that such works owe their principal *raison d'être:* each as it appears supplies a lack and fills a place not previously supplied by the others.

The author's introduction, in which he gives some of his more general views of his subject and lays out his plan for its development in the book, contains several points worthy of note. First, we would notice what seem to us to be very just and well chosen remarks on the use of the term "functional" in speaking of nervous diseases. Noticing the tendency which has arisen of late years to the disuse of the term, while there still exists a belief, and one which is even yet largely spread amongst medical men, that many nervous diseases are accompanied with no organic change, he says, "The difficulty is more of terms than of facts. No doubt many nervous phenomena are met with, and yet nothing is found *post-mortem* that can directly account for them. But this is no proof that lesion has not existed during life. * * * Phenomena are not functional because there is no lesion, but because the lesion is transitory and evanescent. It is equally proved by pathological anatomy, and by clinical observation, that no morbid symptom can manifest itself without some alteration in the nutrition of the organ affected." With this statement of views we can heartily agree, and it is well placed in the introduction of a work on nervous pathology.

A second point to which the author calls attention in his introductory remarks is the close connection between nervous phenomena. Thus, rigor, tremor, spasm, and convulsion, he says, are mere varieties of the same condition, closely allied to incoordination, and through it to paralysis. The same is true of the connection of excitement, delirium, mania, fatuity, and coma. There is a thought here expressed, which, though conveying a truth in some respects almost self-evident, is yet worthy of being noted in the place where it appears.

We think the author slightly undervalues the results of physiological experiment in increasing our knowledge of the phenomena of disease. While it is certainly true that our knowledge of human pathology, as far, indeed, as we have any accurate knowledge, is mainly due to clinical observations and pathological anatomy, yet we, even at the present time, owe something of our acquaintance of the functions of the brain and spinal cord to investigations on the lower animals, and one of the brightest prospects for the future of the study lies, in our opinion, in this line of research.

Dr. Fox divides his subject into two parts. In the first he describes the pathological anatomy of the brain and spinal cord, and in the second he describes the combination of these pathological results in various diseases. All traumatic lesions are omitted ; the work is confined to the consideration of those which are without the proper field of surgery and surgical anatomy. The author admits the imperfections of this division—it would have been possible to have made it more systematic by considering the several anatomical lesions separately, to have given in one place the abnormalities of the vascular system, in another those of the nerve elements, and in still another those of the connective tissues ; but a division of this kind would have led to numerous repetitions, and the one adopted seemed, therefore, more convenient. He appends, nevertheless, to his introduction, a classified list of the principal lesions to which the various organs within the cranium and spinal cord are specially liable.

The first lecture, on congenital abnormalities, gives a very full statement of its subject, and will be found very useful for reference to those who have not the works of the different authors who have made these observations a study. It is not, however, especially instructive to those who are well acquainted with such authors as Gintrac, Geoffroy St. Hilaire, etc. The second, on abnormalities of the vascular system, which includes in its consideration some of the most important subjects of all neural pathology, is hardly less complete in its way, though short, and is much more instructive and valuable. A few points in this lecture deserve notice here. Dr. Fox states that miliary aneurisms of the cerebral arteries are far more common than is usually supposed, and that they constantly co-exist with similar conditions in other organs of the body. This last would seem to be

an unguarded statement. The context, however, does not exactly agree with it; for, instead of giving examples of cerebral miliary aneurisms being found in connection with aneurisms elsewhere, he follows the reverse process, and states that similar conditions have been found in other parts to accompany the disease of the vessels in the brain. We mention this point only because from the wording more might seem to be implied than perhaps was the author's intention. In his remarks on embolism, while he speaks of it as a constant cause of hæmorrhage, he does not mention its effects in producing aneurisms, an accident which, we think, is probably the most common of the two.

Thrombosis of the cerebral arteries is said to be of rare occurrence. This may be true, comparatively, but we are inclined to think that, independently of such of these accidents as are due properly to external causes, such as adjacent inflammations, traumatisms, etc., they are almost if not quite as frequent in the arteries as in the veins. The atheromatous condition, which is one of its most frequent causes, is peculiar, so to speak, to the arterial system. Then, again, in the *ante-mortem* diagnosis of thrombosis the condition of the arteries is one of the most important points that requires attention; in fact, nearly all the cases of paralysis from this cause are due to its existence in the arteries. Under these circumstances we scarcely think that it can be called a very uncommon occurrence.

The remarks on hæmorrhage are, for the most part, very good, and call for no special criticism. Still we notice one inconsistent statement. The author states that hæmorrhage into the cerebellum is very rare, and usually only occurs in advanced age. A little further on he quotes, apparently without question, a table of Gintrac's as to the relative frequency of this accident in the different parts of the encephalon, in which cerebellar hæmorrhages are given as occurring only a little less frequently than those into the corpus striatum alone, and in which, excluding meningeal hæmorrhages, they form about one-tenth of the whole number of cases.

Passive congestion is said to be more common than the active form. We would demur to this statement, if temporary mechanical causes, which can hardly be reckoned as exactly producing disease, are excluded. Apart from these, and including only those cases in which a diseased condition or tendency actually exists, we think the active congestions of the brain would equal if not outnumber the others. With the other remarks of the author on this subject we can generally agree.

The third lecture treats of the subject of inflammation as affecting the nervous centres. Inflammations of the dura mater and the arachnoid are first considered, then acute cerebro-spinal and acute basilar meningitis, and hydrocephalus, encephalitis, and myelitis. In a former number we have taken occasion to give our views in regard to inflammations of the arachnoid, and can only reiterate them here. It is certainly not impossible for

a true arachnitis to exist, but such a condition, in our opinion, must be an extremely rare accident. As Dr. Fox says, "It is not always possible to distinguish diseases of the arachnoid from abnormalities of the under surface of the dura mater; and still less possible is it to separate morbid conditions of the arachnoid from those of the subjacent pia mater, so closely blended with it." Still he gives nearly four pages to the subject of inflammatory changes of the arachnoid, recognizing, however, that they are secondary in their nature. He says, when speaking of arachnitis with effusion, "Although it is difficult to separate the abnormalities of the pia mater from those of the arachnoid, yet it is generally easy to speak with certainty of these abnormalities having their origin in the pia mater." With this statement we cordially agree. A non-vascular hyaloid membrane like the arachnoid is not likely to originate an inflammation, and in nearly all cases where it is found involved in this process it is safe to assume that it only so appears from the real disorder being located in the very closely connected subjacent pia mater. It has seemed to us that the ordinary way of speaking of arachnoid disease is likely to convey an erroneous idea of anatomical and pathological conditions; and, while our author, we think, holds the correct opinion, in the main, in regard to this subject, many, in hastily reading his book, might be misled from the space that is given to the so-called arachnoideal inflammations.

Dr. Fox says, "Whether meningitis ever occurs independently of syphilis, rheumatism, alcoholic poisoning, tubercle, anæmia, or mechanical irritations, is at least an open question." This would seem to exclude the possibility of its occurrence from congestion—of which it is really only a step in advance—besides many other causes to which it is often and even commonly attributed. The author's meaning can scarcely be what this, as it appears to us, somewhat unguarded statement would seem to imply.

Our author criticizes Rindfleisch for his views as to the existence of external hydrocephalus, which he, for his own part, discredits altogether, except in such rare cases as when "fluid in the cavity of the arachnoid is the result of a hæmorrhage into the arachnoidal sack." The description of Rindfleisch, he says, is only that of a case of atrophy of the brain, or defective development, in which the cerebro-spinal fluid takes the place of the atrophied convolutions; and that the cases of reputed external hydrocephalus, and of recovery from tapping the brain, were either cases of this cerebral atrophy or of internal hydrocephalus in which much of the brain substance had been absorbed, and the trocar had been passed, not only through the bone and membranes, but into the cerebral substance, or some accident had ruptured this layer of brain and caused the escape of the contained fluid.

The pages on encephalitis and myelitis, which conclude this lecture, give on the whole a satisfactory statement of the prin-

cipal phenomena of these affections, and call for no special criticism or remark.

The next lecture, the fourth, has for its subject degenerations, and naturally succeeds that on inflammation, inasmuch as the processes it describes are very largely the results of inflammatory action. The author includes under this head atrophy, softening and the various forms of sclerosis, and considerable space is given to each of these. He gives in this chapter and in the next one, on tumors, rather a collection of the opinions of others than his own; but he adds an occasional criticism or an independent opinion here and there, and some illustrative cases of his own observation. What strikes us as objectionable in the author's method and treatment is, that, with all his industry and knowledge of the literature which makes his book valuable, he gives too little of an impression of positive views in many cases where authorities differ, and where, in our opinion, such are justifiable, and even to be expected. In this respect the work appears to us as defective as a guide to students and beginners in medicine, whatever its value may be to those who have been longer in the field. It is true that he does express himself frequently as agreeing or at variance with some author or opinion quoted, but this is often lacking where we should expect it, and the arrangement, perhaps, conveys this impression at times when such was not his intention. There is a lack of quotation marks also, which renders it a little difficult in some places to say at first sight whether the author is giving the opinions of others or his own.

Apart from this kind of general criticism these two lectures are in many respects very useful statements of the principal facts known in regard to their subjects. In the main, Dr. Fox follows Rindfleisch in his description of the tumors of the nervous centres, differing from him only in a few points, as for example, in regard to tubercle, which he considers to be of one kind only, the caseous nodule being only an agglomeration of the miliary tubercles.

With the sixth lecture commences the second part of the book, according to the author's division. The first subject considered is delirium. In this lecture the statements are given very clearly —first the pathology of delirium in general is discussed, and the remaining and larger portion of the chapter is taken up with the subject of the special form of alcoholic delirium. Dr. Fox makes the causes of delirium three in number—anæmia, hyperæmia, and toxæmia—not recognizing at all any possibility of the occurrence of this symptom from any cause unconnected with the blood-supply. Even shock, he thinks, can affect the brain only through its circulation. His statement of his belief is as follows: "My own belief is that delirium is in all cases an expression of functional inactivity or perverted activity, accompanied or caused by deficient blood-supply; in anæmia, from deficient circulation; in toxæmia, from the circulation of the blood, part of which, at least, is unfit for functional purposes,

and, therefore, useless; in hyperæmia, because from the very pressure upon the vessels the due interchange between tissue and nutritive material is rendered abnormally difficult." This view would exclude all possibility of delirium from nerve change, or exhaustion—a cause we are not inclined to reject—and it, moreover, ignores completely the nervous influences which have to do with the regulation of the blood-supply. An abnormal functional activity may pass readily into delirium, accompanied, it is true, by circulatory disorders within the brain, which are not necessarily to be considered as primary causes of the delirium, but rather as secondary results of the original nervous disturbance. It would not be difficult to make a *reductio ad absurdum* of such a theory of cerebral disorder, if it were carried out to explain all of the various forms in which it may appear as well as delirium. The expression "accompanied or caused by deficient blood-supply" may, perhaps, save the author, in part, from this criticism, since it implies the circulatory trouble may not always have a causal relation, but that, certainly, is not the sense of the context. He elsewhere doubts the possibility of cerebral excitability independent of the vascular conditions. He is also hardly consistent with himself; for, further on in the book, when speaking of epilepsy, he adopts the theory of Hughlings Jackson of discharging lesions, which, however he may reconcile it with his previously expressed views, necessarily implies a direct and, as it were, a primary excitability of nerve-elements.

The lectures on insanity, aphasia, glosso-laryngeal and facial paralysis are instructive, and do not appear to call for special criticism, except, perhaps, that the theories of the author in regard to the circulation and nutrition of the nervous centres are still prominent.

In the tenth lecture he begins with the subject of progressive muscular atrophy, and his remarks on this disease are chiefly notable for the complete omission of all reference to what is by far the most important work on the subject, and one of the most remarkable medical monographs of recent years, that of Friedreich, which had certainly appeared long enough to be noticed by the author. The fact is, however, that he seems to be largely unacquainted with recent German literature—all his references to German authors being to those whose works are accessible through translations. Of course, the neurotic theory of this disorder is favored.

In the eleventh lecture, the subjects of which are epilepsy and chorea, the author again develops his theories as to the action of the blood in producing the abnormal impressibility of the nervous centres. In speaking of the pathology of epilepsy, he maintains, first, that clonic convulsion is evidence of partial arterial spasm of the base of the brain and spinal cord, and then to account for this arterial contraction he brings in the condition of the blood. To quote his own words, "Two factors at least are necessary for the production of an epileptic attack—the exciting cause, and an

impressionable condition of the nervous substance, especially, probably, of the medulla oblongata; and this leads me to the real difficulty of the pathology of epilepsy, viz.: What is the cause of the impressionable condition of the nervous system?

"That which induces this arterial spasm, or rather that which causes the impressibility of the sympathetic filaments, which rule the calibre of the arteries, must be the condition of the blood itself." A little farther on he becomes more guarded, and says, "All clinical facts seem to me to point to the causation of epilepsy as depending either on a limitation of the supply of blood to some portion of the encephalon or to an abnormality in the blood itself, and of all abnormalities the most important is the diminution of oxygen." Then he gives a statement of the views of Hughlings Jackson as to discharging lesions, with which he mainly agrees, and gives his own conclusions, which end as follows: "The impressibility of these discharging centres is due to abnormalities of nutrition.

"These abnormalities of nutrition may be from variations in, and especially deficiency of blood-supply, alteration in the character of the blood itself, particularly in its power of carrying oxygen, and, perhaps, sometimes in the substitution of an abnormal substance for one of the elementary constituents of the nervous tissue." We have here, first, a positive statement that the impressibility of the nerve centres depends on the condition the blood is in; next, that epilepsy, including, of course, all its stages, may depend either on a limited blood-supply to some portion of the brain, or to some abnormality in the quality of that blood-supply; and, lastly, the adoption of a theory of an unstable explosive condition of nerve elements dependent on prior abnormal nutritive conditions of either the quantity or the quality of the blood-supply. We have tried to state our author's views correctly; longer extracts, including the context of the passages quoted would, perhaps, have made the points we wished to show more plain, but our space is limited. There seems to us to be a looseness in his way of treating the subject, that, to say the least, is objectionable.

In the author's pathology of tetanus, his predilections for attributing everything to some condition of the blood again come to the front. He thinks that in this disease we must look for the connective lesion between the causal injury and the spinal disorder in the chemistry of the blood, and quotes strychnia poisoning as an analogous condition, strychnia, in his opinion, acting on the cord through the blood. "The presence of strychnia in the blood," he says, "or, rather, the effect that strychnia has on the physiological conditions of the blood, has been demonstrated as the cause of the spasmodic phenomena. Dr. Harley has shown that blood mingled with a solution of strychnia is incapable of absorbing oxygen in the usual proportion." This last fact scarcely warrants the conclusions drawn from it, espepecially when we remember that the convulsions of strychnia

have been produced in bloodless frogs. But this is a fair example of a fault of the author which we have tried to point out—a loose mode of reasoning and a hasty and inconsiderate adoption of theories—which, it appears to us, is visible elsewhere in his work than in the places we have especially mentioned.

Apart from the features which we have endeavored to criticize, the general impression produced by the book is a favorable one. Dr. Fox seems to be well acquainted with his subject, and its treatment by him is, on the whole, satisfactory. To each lecture is appended a list of works to be consulted; but the author's acquaintance with the literature seems to be more extensive than this. But from these and other sources he has produced a work which will be found valuable as a book of reference to the student and practitioner.

A few points, apart from the subject matter of the book, appear to call for notice. In the first place, it lacks what every book of this kind should have, a well-arranged and convenient index—it has nothing of the kind. Then we notice minor errors, slips of the proof-reader scattered occasionally throughout its pages, misspelled foreign words, etc. These are, of themselves, of slight importance, but they injure the appearance of any book in which they occur.

The general make-up and typography of the book are all that could be asked—the colored lithographic plates, eighteen in number, add greatly to its handsome appearance.

III.—BASTIAN: PARALYSIS FROM BRAIN DISEASE.

On Paralysis from Brain Disease in its Common Forms. By N. Charlton Bastian, M.A., M.D., F.R.S., etc. New York: D. Appleton & Co., 1875. Chicago: Hadley Bros. 8 vo. 340 pp.

This work consists of a republication, with enlargements and revision of a series of lectures delivered at the University College Hospital during the year 1874, and published at the time in the pages of the London *Lancet*. As that well-known periodical, in the form of its New York reprint, is largely circulated in this country, the substance of these lectures may not be, and probably is not unknown to many of our readers. All, however, will, we think, welcome their appearance in their present form; for, as the author states in his preface, "no department of medicine stands more in need of being represented in a text-book

of moderate compass," and it appears to us that he has met this want in a very thoroughly satisfactory manner. Apart from these lectures, indeed, we know of no work or serial course of lectures published in a medical journal, that up to the present time, has systematically developed the subject to any extent in the English language. Therefore we think Dr. Bastian's apology for the short-comings of his book, relatively, at least, uncalled for; there is nothing with which it can undergo any unfavorable comparison. And taking it by itself, it may be considered, to a very great extent certainly, as an epitome of the general condition of our knowledge of the subject of the more common forms of cerebral paralyses, and one which may be followed, even in a time like the present, when research in the peculiar field it occupies is so active, when hypotheses are so rapidly offered and verified or overthrown, and when actual contributions of fact are so quickly overshadowed or re-interpreted by newer discoveries. The eminent abilities and wide knowledge of Dr. Bastian as a physiologist, specially fit him for clinical observation and teaching in a department of practical medicine which is so directly connected with and dependent on modern anatomical and physiological research, and which, vague as our knowledge in regard to it may be in very many respects, has nevertheless made perhaps the greatest progress of late years of any of the departments of medicine.

The lectures which make up this book are consecutive, each one taking up the subject at the point left at the close of the former one, and not being each wholly devoted, in all cases, to the consideration of a special phase or part of the subject. The order in which the subject is treated is as follows: In the first chapter the causes of hemiplegia are taken up; the next four are chiefly devoted to a description of the symptomatology of the different forms; the sixth chapter considers the subject of regional diagnosis in those in which the cerebrum only is involved; the seventh treats of the special symptomatology of lesions of the cerebellum and the general pathological diagnosis of hemiplegias, and the eighth and last chapter has for its subject the prognosis and treatment of these affections. We can only briefly notice a few of the principal and most characteristic points made in these chapters.

In the first lecture, that on the causes of hemiplegia, the author gives a rapid review and a tabulated statement of all the agencies that he considers as proximate causes of this condition, including tumors, abscesses, traumatisms, congenital atrophy, etc., but confines his more detailed attention to such as produce the more sudden forms, such as rupture, occlusion and spasm of the cerebral vessels. And after mentioning, under the first of these heads, the hæmorrhages that occur in the meninges, he gives a list of the localities within the brain, hæmorrhages into which may be expected to be recognized during life. As this is of considerable interest we will reproduce it here. He says hæmorrhage into the brain may be recognized in the following sites:

1. In the substance of one of the hemispheres, with or without implication of the cortical substance, each hemisphere being roughly divided into (*a*) an anterior, (*b*) a middle, and (*c*) a posterior portion.
2. In or just outside the corpus striatum.
3. In or just outside the optic thalamus.
4. In either of the last two situations, together with effusion into the lateral ventricles.
5. In the crus cerebri.
6. In the pons varolii. (*a*) In its centre; (*b*) in the upper part of one lateral half; (*c*) in the lower part of one lateral half.
7. In the cerebellum. (*a*) In one of its lateral lobes; (*b*) in its middle peduncle; (*c*) in its median lobe.

This, as Dr. Bastian states, is no undue subdivision. We are not at all sure but that it may even be too restricted, and that we have not good reason for thinking that, even in the present state of our knowledge, we may attempt to carry our regional diagnosis of brain lesions to a much greater degree of accuracy; at least in cases characterized by especial symptoms. We certainly have one kind of local lesion characterized by the special symptom of loss of speech which is not included in the above, and others have been diagnosed. We therefore think that we should at least endeavor to discriminate, even more closely than is indicated in the above category, even though our efforts be only tentative. And the prospect seems to be that in the near future the possibilities in this direction will be very largely increased.

In the second lecture Dr. Bastian, after giving an account of the vascular supply of the brain as made known largely by Heubner and Duret, passes at once into the symptomatology of hemiplegias. This subject, as was before stated, is continued through this and the three succeeding lectures. In his introductory remarks he takes occasion to refer to some recent utterances of Dr. Brown-Sequard in regard to the indirect effects of brain lesions, which, to say the least, were unguarded, in that they implied that direct effects of special lesions of the brain are not systematically met with. From still more recent utterances of this distinguished physiologist, we are not sure that he did not actually intend this to be inferred, or that he does not hold, in some degree, a rather reactionary set of views in regard to certain questions of cerebral pathology. If this be the case, as there is some appearance that it may be, we can only here offer our decided dissent from all such opinions. We prefer, however, to hold the opinion expressed by Dr. Bastian, that such are far from being the views that Dr. Brown-Sequard would wish to impress upon his readers, at least when carried to their full extent.

After describing the symptoms of a paralytic attack, the various modes of onset, the apoplectic, the epileptiform, and the simple form without either convulsions or loss of conciousness,

the temperature variations in hemiplegia, etc., the author enters, in the fourth lecture, into a discussion of the more special symptoms, such as the degree of motor paralysis, the implication of the special senses, the irregularities in the distribution of the paralytic symptoms and the phenomena of rigidity in the affected limbs, and reflex and choreic movements. A few points in this chapter seem worthy of notice on account of the views held by the author, or because, as it appears to us, he has in one or two places omitted to mention features in certain cases of hemiplegia, which seem to us important, as possibly affecting the diagnosis, or significant in regard to the pathology of the disease. In general the subject is very fully and satisfactorily treated; indeed any criticism upon this part of the book seems almost uncalled for.

In regard to the sense of sight, Dr. Bastian favors the hypothesis that there exists a complete decussation of the optic fibres, as held by Brown-Sequard, on the ground that pathological evidence points strongly in that direction. He makes the statement that, as a rule, pressure upon one optic tract only causes defects of vision in the eye of the opposite side. If this be the rule it seems strange to us that the theory usually ascribed to Wollaston, and now generally held by ophthalmologists, should have ever been considered necessary to account for the affections of sight from intracranial causes, apart, as a matter of course, from those due to a descending neuritis. Dr. Bastian gives examples to justify his opinion, among them the autopsy of Prof. DeMorgan, the mathematician, in whom a long-continued, almost congenital blindness of the right eye was found to be accompanied with atrophy of the corresponding optic nerve and the opposite optic tract, the other remaining perfectly normal. There are some difficulties in understanding some cases of hemiopia according to the commonly received theory, without supposing a combination of circumstances that must be of extremely rare occurrence: nasal hemiopia, for example, which would require a symmetrical lesion on either side. This difficulty is however not less and is even greater than that met with in accounting for other cases of lateral hemiopia, under the hypothesis of the complete decussation in the optic chiasm. And notwithstanding the experiments of Dr. Brown-Sequard, and the asserted anatomical demonstrations of Biesadecki, Mandelstamm and Michel, the observations of Cohn and others, the Wollaston hypothesis still seems to hold its own in the favor of the majority. It is worthy of mention moreover, in this connection, that M. Charcot, while recognizing its purely hypothethical character, and being also well acquainted with all the objections that have been made against it, still holds in his recent lectures on the localization of cerebral diseases, that it meets the conditions better than any other that has so far been offered.

The remarks on other sensory phenomena, the imperfect and irregular forms of hemiplegia, those in regard to the implication of the special cranial nerves, the sphincters, and on the early

and late rigidity of paralyzed limbs, and on the motor troubles, such as tremors and choreic movements, are quite full and instructive, and will be especially useful to the reader. We do not find, however, what might well come under the subject of this lecture, any mention of the associated movements in paralyzed members in old cases of hemiplegia, described by Westphal. Thus, in some of these cases, when any movement is made of the sound limb, the corresponding paralyzed one involuntarily follows it as far as is possible with its stiffened and rigid condition, although at the time it is perfectly incapable of independent voluntary motion. In the remarks on the choreic movements of hemiplegic patients, also, there is a difference in the conclusions of the author and those of M. Charcot, who states, we believe, that the hemichorea only occurs with the hemi-anæsthesia and from lesions in a closely situated if not an identical point in the crus. Dr. Bastian mentions two cases, in which he states there was no marked diminution in sensibility on the affected side.

The fifth lecture deals with the alterations in nutrition that follow paralytic attacks, the sloughs, congestions, dropsies, arthritic disorders, neuritic affections, atrophies, etc., which are more or less frequently met with in hemiplegic persons. The author calls attention to the fact that the neuritis and arthritis often supervene with and constitute part of the state he had previously mentioned as "late rigidity." We believe that there is reason to think that both the joint affections, and others that he has mentioned, are often due to morbid conditions, irritative or inflammatory, of peripheral nerves, induced either by the transmission of direct irritations from the encephalon, or propagated through the spinal cord, which, as is well known to be the case sometimes, is itself involved—a true descending neuritis in fact. Our reasons for holding this opinion are numerous, and can be better explained elsewhere; the space of a notice like the present is too limited for their exposition.

The latter and much the larger part of this lecture is occupied with the subject of the functional differences between the two cerebral hemispheres, as exemplified in the phenomena of disease. In this connection, much space and attention is given, as might be expected, to the subject of aphasia. The remarks on this subject are in the main well taken and the instances given instructive, but the discussion is too short to be altogether satisfactory, and we are not altogether satisfied with the author's treatment of it as far as he goes. As regards the anatomical seat of the pathological changes in aphasia, he quotes Broadbent's statement as to the commissural connections of the third frontal or Broca's convolution, as affording a plausible and probable explanation of its importance.

The peculiarities of the right cerebral hemisphere as shown in the phenomena of disease, are summed up under five heads, which, substantially, are as follows: (1) Lesions of the right

hemisphere, all other things being equal, are more frequently and rapidly fatal than those of the left hemisphere, and the resulting hemiplegic symptoms are more severe and lasting; (2) disorders of nutrition are decidedly more frequent with lesions of the right than of the left hemisphere; (3) according to Callender and Brown-Sequard, convulsions and tonic spasms of the limbs, and also the conjugate deviation of the eyes, are more frequently met with in lesions of the right hemisphere; (4) according to Brown-Sequard, the various forms of hysterical paralysis are more frequent in the left than in the right limbs; and (5) and lastly, lesions of the right hemisphere are much more apt than those of the left to give rise to paralysis or convulsions on the same side of the body. This last is given as a purely empirical fact; Dr. Bastian, however, to account for this occasional occurrence of hemiplegia on the site of the lesion, suggests that it must not be forgotten that the fibres on the outer part of the anterior pyramids of the medulla do not decussate, and also that it is not impossible even that vices of development may exist, even in man, so that in rare instances the decussation of the fibres in the pyramids does not take place. He says: "It seems worth while to entertain the possibility of such an occurrence, rather than to allow a feeling of general mistrust to spring up as to the regularity of the phenomena produced by brain disease in different regions." His suggestion that in all future cases the brain and medulla should be most carefully examined, is certainly worthy of attention, and we hope it may be carried out. No mention is made in this lecture of the hypothesis that has been advanced by some, of the relation of the functions of the right hemisphere to the emotions—it was perhaps considered too vague and unfounded to be worthy of any particular notice.

In the remarks on regional diagnosis, while they are all excellent and worthy of close attention, there is very little that calls for very particular mention here. Dr. Bastian asserts his belief that the posterior lobes of the brain have more to do with the higher intellectual functions than the anterior ones, a point in which he is at variance at least with some of his contemporaries; nevertheless there appear to us to be some good grounds, inferential ones, for his opinion.

That part of the seventh lecture which has to do with the diagnosis of lesions of the cerebellum, its different portions, etc., is like the other parts of the work, good in both the matter and its presentation. The old phrenological theory of the connection of the cerebellum with the sexual functions is noticed, as supported to some extent by the symptoms following lesions of its middle lobe. The examinations of Lombrosi in the cases of the insane, also support the view that at least a part of the cerebellum has to do with this function.

Next he takes up the subject of the pathological diagnosis of brain lesions, the recognition of the apoplectic coma and its causes, and the diagnosis of embolism, thrombosis and hæmor-

rhage. Some of the difficulties of the first of these problems, the diagnosis of the causes of apoplexy, have been recently well set forth by Dr. Hughlings Jackson in a paper in the *Med. Times and Gazette*, in which he points out that the coma from an enormous cerebral hæmorrhage may not prevent the execution of extremely complicated habitual movements, the reflexes of education as they have been called by Onimus, thus embarrassing the physician, and has also shown that the alcoholic coma may closely simulate that from hæmorrhage, in such symptoms as the divergence of the eyes, etc. Our author also points out quite fully the difficulties in these respects, and also those of the differential diagnosis between hæmorrhage, embolism and thrombosis, and his discussion of the subject is very just and instructive.

The eighth lecture, on prognosis and treatment, though short, is excellent in all respects. The remarks on treatment are especially good and may be generally safely followed. Dr. Bastian makes one recommendation, guarding it, however, with a statement of the necessity of caution, which may be questioned by some: that of the nitrite of amyl in cases where there are reasons for believing that thrombosis or embolism of some large artery exists, for the purpose of producing its characteristic physiological effects on the small arteries of the brain. If this treatment is ever adopted, the cautions as to diagnosis will be amply needed, and on this account every means should be taken to establish the nature of the lesion beyond a doubt, before having recourse to this method of treatment.

We can only close by repeating our estimate of this work which was given in the beginning: that it is an important acquisition to the medical literature of the day, and that it supplies, to a very considerable extent, a real deficiency that has heretofore existed. We should be pleased to see it, in the words of the author, superseded by something better, but we have no anticipation that that will occur directly. In pointing out a few of what appear to us as in some respects short-comings of the book, we have done so with no intention of fault-finding, for it would be beyond the range of possibility for any work of this class to be free from them a few months after its composition, but to suggest to our readers who will see it, some facts that it may not contain or some views that it does not develop. Much more could have been done in this direction, but the space required is not furnished in a notice like the present. We cordially recommend the work to our readers.

IV.—SHORTER NOTICES.

I. Transactions of the College of Physicians of Philadelphia. Third Series. Volume I. Philadelphia, 1875.

II. Klinische und Anatomische Beitraege zur Kentniss der Spondylitis deformans als einer der haufigsten ursachen mannigfacher Neurosen, namentlicch der Spinal-irritation. Von Dr. Julius Braun, Brunnenarzt zu Rehme-Oeynhausen. Mit vier Holzschnitten. Hanover, 1875. (*Clinical and anatomical contributions to our knowledge of spondylitis deformans as one of the commonest causes of many neuroses, and especially of spinal irritation.*)

III. On Periodical Melancholia. By William B. Neftel, M. D. A paper read before the New York Medical Library and Journal Association, Oct. 30, 1874. (Reprinted from the *Medical Record* of Aug. 14, 1875.) 22 pp.

IV. A Statement of the Relations of the Faculty of Medicine and Surgery in the University of Michigan to Homœopathy. Detroit, 1875. 12 pp.

V. Transactions of the Medical and Chirurgical Faculty of Maryland. Seventy-seventh Annual Session, held at Baltimore, April, 1875. 226 pp.

VI. Hysterical Symptoms in Organic Nervous Affections. By E. C. Seguin, M. D. (Reprinted from Beard's *Archives of Electrology and Neurology*, May, 1875.) 16 pp.

I. The transactions of the Philadelphia College of Physicians forms a neat octavo of one hundred and ninety-two pages. Of the twelve articles it contains, but three or four come within the scope of our journal, and call for attention here. The first of these is the report of Dr. W. W. Keen of the physiological experiments performed by him on the corpse of the murderer Heidenblut to test the functions of the laryngeal and intercostal nerves, etc.; the second is by Dr. Weir Mitchell, on the use of the nitrite of amyl; the third is a paper on tetanus by Dr. W. S. Forbes, Senior Surgeon of the Episcopal Hospital at Philadelphia; and the last that comes in the class of subjects of our journal in any way is on the treatment of diabetes insipidus by ergot, by Dr. J. M. Da Costa. The first two of these are, as might be anticipated from the names of their authors, excellent papers, but they have appeared before in substance in the pages of the Philadelphia medical journals, and, perhaps, we need not, therefore, repeat, by noticing them in detail, what is probably already familiar to the reader. The third paper is, in a sense of the

word, remarkable. The author gives an account of a case of traumatic tetanus, resulting from a severe burn, treated successfully with the nitrite of amyl, and then gives his own theory of the pathology of tetanus. We have given this in detail in the Periscope of the present number, but it will do to mention here also. The author seems to be suffering under an attack of confusion of terms; he appears to have confounded in his mind the physiological usage of the word tetanus with the disease, and he therefore gives the physiology of muscular contraction for the pathology of tetanus. He says: "Tetanus is the result of an augmented disintegration of muscular tissue; that the products of this disintegration, lactic acid and kreatine, further excite the nerve peripheries, until by reflex action there is established a 'violent and painful contraction of the voluntary muscles, which is long continued, and heretofore uncontrollable; that in traumatic tetanus the augmented disintegration of muscular tissue is caused by an increased excitation of the nerve peripheries exposed. That in idiopathic tetanus there is a self-generated power akin to the poison of rabies and to strychnia, exciting the nerve peripheries, which, by reflex action, causes the augmented disintegration of muscular tissue, and the products of disintegration, lactic acid and kreatine, which further excite the nerve peripheries until there is established the condition known as tetanus." If we understand the sense of this passage, it means that tetanus is due to muscular disintegration, which by its products excites the peripheral nerves; again, that this disintegration is caused by the excitement of the peripheral nerves, and still again, that tetanus, in its idiopathic form, is caused by some specific poison, and, finally, that the convulsions and other nervous phenomena are altogether reflex. It seems like a pretty well-marked example of loose writing and analysis, of which there is altogether too much in medical literature. A review of the order of phenomena in tetanus, which any one can make, will show how completely the author of this paper has reversed them, and made the incidental result the primary lesion. We do not think, apart from the case he reports and its evidence of the usefulness of nitrite of amyl in this disease, that he has contributed anything of value to the literature of the subject.

Dr. Da Costa's paper, on the use of ergot in diabetes, though short, is interesting and suggestive, and is a real contribution to the therapeutics of that disease.

II. Dr. Julius Braun calls attention to what he considers as a frequent cause of nervous symptoms,—the existence of a rheumatic disorder of one or more vertebræ, causing deformities of the processes and affecting to a greater or less degree the nerves that pass between or are adjacent to these processes. The principal cause of this affection is considered to be cold, or local chilling of the vertebræ, and this fact will also account for the predominance of cases involving the cervical vertebræ, which are usually

the ones most exposed. According to the author, the lateral processes are the most frequently involved, and in many of the cases the affection is throughout unilateral. The cord and the meninges are generally uninvolved in these cases; the disorder is confined usually to the implication of the outgoing and adjacent nerves.

The nervous symptoms to which this condition may give rise are of course numerous, and are explained by a study of the anatomical relations of the vertebræ. Dr. Braun therefore gives a detailed account, aided by a wood-cut, of the arterial and nervous branches within the spinal canal, and in the intervertebral foramina, according to the researches of Rudinger, to illustrate this part of the subject. Sixty-one cases are related, each with more or less of detail, and an analysis of them all is given in a separate place. The pamphlet is in all respects worthy of the attention of the practical physician.

III. The principal feature in this paper is the description of a case, illustrating what the author considers to be a new variety of melancholic insanity, and to which he gives the name, "periodical melancholia." In this case the patient had yearly attacks of acute melancholia, accompanied with loss of flesh, trophic changes, etc., for a period of twenty-three years, without any secondary affections being developed. The attacks lasted from two to eleven months each, were ushered in by a general anæmic condition, and always suddenly disappeared when the symptoms were apparently at their worst stage, leaving the patient for a few months in a mentally healthy and normal condition.

The treatment used by Dr. Neftel was galvanization of the head and cervical sympathetic, and the results were on the whole very favorable. The interval between the attacks was increased to seven months; the trophic troubles did not make their appearance on the recurrence of the disorder, and though the attack lasted five months, it was less severe in many respects. The same occurred on its second repetition after treatment, and the progress, as far as reported, seemed favorable.

The latter part of the paper is given to the subject of melancholia in general, its phenomena, treatment, etc. Dr. Neftel believes that the galvanic current offers the best results in the treatment of this disease. The details of his peculiar method in its application are promised in a future article.

IV. This pamphlet is, we believe, a reprint of an article that originally appeared in one of the daily journals of the city of Detroit. Its subject is of interest to the profession in that it concerns in some degree the professional conscience and honor. The medical faculty of the University of Michigan are placed, by the recent action of the Board of Regents, in an unenviable position. They are forced, if they keep their positions, into a *quasi* recognition of homœopathy. On the other hand, by resign-

ing they may be virtually giving the institution over into the hands of unscrupulous and designing men. This paper gives the position of the members of the medical faculty who hold that the latter evil would be greater than the other, and the resolution quoted from the former proceedings of the State Medical Society would seem to endorse their course.

We have no space here to give our own views in regard to this question, but one thing, it strikes us, will be a certain result of this state of affairs, which is perhaps unimportant in itself, but uncomfortable and unpleasant. The professors of the regular medical faculty, with the exception of the professor of the practice of medicine, will regularly appear as professors in the homœopathic medical department of the university, not perhaps in the regular university catalogue, but in the homœopathic journals and circulars scattered throughout the country. The homœopathists have nothing to lose and everything to gain by this course, and there is no question but that they are unscrupulous enough to adopt it, since the Regents have so kindly placed the faculty at their mercy in this respect.

Whatever course is finally adopted by the medical profession of the country generally in regard to this question, we hope for good from its agitation. The homœopathists have been so long allowed to do all the talking to the public generally, and have so industriously utilized their opportunities, that they have created in some places even a predominant public sentiment in their favor that is only partially counteracted by their mistakes and imbecilities. We hope for a healthy enlightenment of public sentiment, and even some progress towards common sense on the part of the homœopathic exclusive dogmatists as a final result of this at present unpleasant affair.

V. The Maryland Transactions forms a compact octavo volume of over two hundred pages, and contains several very interesting and instructive papers by various authors, together with the usual reports on surgery, anatomy, physiology, obstetrics, materia medica, and therapeutics. We can only mention the titles of the three that come within our special field. They are a paper on tinnitus aurium by Dr. Samuel Theobald, one on digitalis in cardiac disease by Dr. S. C. Chew, and an article on the treatment of paralyzed muscles by elastic relaxation by Dr. J. Van Bibber, the same in effect, we believe, as the one read by him on the same subject before the American Neurological Association in July last. The volume is a very creditable one on the whole to the Association under whose auspices it appears.

VI. Dr. Seguin, in this paper, calls attention to a feature in the symptomatology of organic nervous disease, which sometimes seriously complicates the problem offered to the physician in their study, the so-called hysterical symptoms that are not unfrequently met with in this class of cases. We cannot, in the

space allowed us, give more than the conclusions arrived at in this paper. Dr. Seguin says :

"The general conclusions of this essay are :

"First, I have brought forward facts to show that many hysterical symptoms may occur in diseases of the spinal cord and brain.

"Second, that in diseases of the spinal cord these symptoms appear merely as a matter of coincidence.

"Third, that in cases of cerebral disease the hysterical symptoms have a deeper significance, being in relation to the hemisphere injured."

He gives some sixteen cases illustrative of the points summed up in these conclusions. The article, though brief, is an instructive and suggestive one.

Editorial Department.

THE CLINICAL STUDY OF INSANITY.

FOR a long time past we have been impressed with the neglect in our courses of medical study—at least in this country—of that most important class of diseases comprehended under the title of "insanity."

Strange as it may seem, there is no valid reason for this state of things. There can be no doubt that insanity, in all its forms, depends, so far as it is amenable to *medical* treatment, on some form of disease, or at least disorder, of the nervous system. It may depend on either some hereditary or acquired change or instability of structure, or on some change as regards quantity in the blood-supply, or on some noxious element in the blood itself, or on all these conditions together. It may depend on either physical or moral causes; but at any rate it must involve in one way or another, at some stage in its progress, actual disorder of the nervous system, which it is of the last degree of importance for the physician to ascertain as the indispensable first step toward a truly rational prognosis or plan of treatment. Why not make such diseases a part of the course of medical study as well as those of the lungs, or heart, or of any other part of the body? Partly because of the assumed difficulty of their profitable study and treatment, and partly on account of the unpractical way in which the subject is too often presented by those who are called upon to teach or expound it, and partly because of the, to a certain extent, false opinion which is entertained, that such affections can only be treated successfully at the asylum.

There is no tenable reason why they should not be studied by every medical student just as other diseases are, but on the contrary, there are most cogent reasons why they should be made from this time forward a part of the regular curriculum, in

this way removing what must appear to every thoughtful person as one of the standing reproaches of medical instruction. It is not to be expected that every physician should become an expert in the diagnosis and treatment of insanity, but it is reasonable and right to expect such a knowledge of the subject as will enable the practitioner to recognize insanity in its beginning, and to be intelligent enough to know the unspeakable importance of *its early treatment* on enlightened principles, and the consequent dangers of neglect or delay, and especially to be fitted to appear usefully in such cases in a court of law.

If it is possible to give the amount of instruction in insanity at which we have hinted, then there is no good reason why the colleges should delay in establishing courses, systematic and clinical, to include this important class of diseases. It is true it has been done in a few cases in our own country, and in many, perhaps in a majority, of the British and continental schools of repute. This is a clear indication that the need is being felt as never before. But as evidence that even in Great Britain the actual movement is far behind the practical demand for it, we would point to the petition which has been presented this year by the leading alienists of that country to the various medical examining boards there. We quote that part of the petition which suits our present purpose. It is as follows:

"1. That your petitioners are lecturers on insanity or psychological medicine in the schools of medicine to which their names are attached as below.

"2. That their courses of lectures are not (by the regulations of any qualifying board) imperative on students of medicine as a part of their curriculum of professional study.

"3. That your petitioners are aware of the grave objections to adding to the already large number of subjects which students of medicine have to master during their period of study, but they venture respectfully to suggest that the entire absence of any provision for the clinical study of so important a branch of medicine as insanity and its kindred diseases cannot but be prejudicial to the interests of a large majority of students in their future careers.

"4. That insanity is not (like diseases of the eye, teeth, etc.) to be met with in the wards of a general hospital, and that consequently students have no opportunity for observing it without attending at a lunatic asylum.

"5. That, of the great number of asylums and hospitals for the insane which there are in the country, there is at least one contiguous to every medical school in the kingdom.

"6. That your petitioners not only lecture on insanity, but also have the means of affording clinical instruction in asylums for the insane, of easy access to the students, and that their lectures and *cliniques* include both insanity and many other important nervous diseases of a class which are not usually seen in general hospitals, such as epilepsy, paralysis, softening and tumors of the brain, chorea, hysteria, hypochondriasis, and others.

"7. That there are, on the narrowest computation, four hundred medical men now engaged in the specialty of mental disease, either as officers or as medical attendants at the asylums and other receptacles for the insane in the United Kingdom of Great Britain and Ireland, this number having greatly increased of late years, and there being an increasing difficulty in procuring qualified assistants for asylums; and that it is of the highest importance that those entering this department in future should have some practical and scientific knowledge of this most difficult branch of medicine, not only for their own comfort and satisfaction, but also in order to the proper treatment of the insane and the advancement of science."

The list of signers of the petition includes the names of Drs. Blandford, Crichton Browne, Clouston, Hunt, Jamieson, Laycock, Robertson, Sankey, Sheppard, J. Batty Tuke, Wickham, Rhys Williams, Yellowlees, etc.

Every year medical instruction in this department is becoming more imperative, at least in our own country. And what we need is not simply a course of lectures of the ordinary kind on the more superficial or exterior phenomena and divisions of insanity, such as on mania, acute and chronic, and monomania, mania homicidal and suicidal, dementia, etc., but back of and beneath this—now that such a course is becoming possible—as careful a study as the present state of our knowledge will permit, of the anatomy and physiology of the brain, its nutrition, its vascular supply, and the actual action on it of various noxious agents, whether medicinal or otherwise, and all that is known or that can be reasonably inferred as to the pathological conditions of the brain, in insanity in general and in particular.

We tell but the truth when we say that too many of those at this hour virtually in training in our asylums to succeed to the responsible management of such institutions in the future, must, under the systems of instruction to which they are subjected, be and remain ignorant of what it is really indispensable they should know in regard to the anatomy and physiology of the nervous system; such a degree of knowledge too as is now clearly within our grasp. Indeed, the same remark must be made of too many in our own country and elsewhere who are

charged with the medical management of vast numbers of the insane.

But whatever deficiencies have existed in the past, or do now exist in medical instruction in the respect mentioned, there can be no longer any excuse for continuing for the future the wretched neglect that we have tried to point out. If there is not less instruction in the mere classification of patients, let us have the knowledge imparted that will lead to a more intelligent study and accurate analysis of *individual cases* in their *interior* conditions and relations as well as the more exterior; and if not less of the nurse and warden class of accomplishments, more of those which solidly befit the physician to have the medical control of large masses of the insane who are suffering from some form of brain or nerve lesion as a rule. We are aware of many of the difficulties under which the superintendents of hospitals for the insane have hitherto labored, more especially in this country; but we think we can see the dawn of better things, and no small part of this will consist in a change, not only in the extent and thoroughness, but in the *direction* of medical instruction in insanity.

THE CARE OF THE INSANE POOR.

IN a former number we called attention to the condition of the asylum for the insane at Steilacoom, in Washington Territory. We spoke then of the abuses which were morally certain to spring up under the miserable system which has been adopted there, in relation to the public care of the insane. Since then our expectations have been amply fulfilled by the investigations which have been made into the actual condition and conduct of the institution. We hold now in our hands a pamphlet recently issued, entitled "*A Supplement to the late Asylum controversy, by members of the Medical Society of Washington Territory*," and which recites in detail abuses and outrages that are a shame to any civilized community in the world. But unfortunately we need not go beyond the

Rocky Mountains to find examples of inhuman treatment of the insane—especially our insane poor—who find their way into our county and some of our city almshouses. The same chances for abuse—such as we will now refer to—exist however in the majority of the states and territories throughout the Union. We have lately had occasion to inquire into the actual condition of the insane in several of the almshouses in our more prominent counties in the northern part of this state (Illinois), a few of the results of which inquiry we subjoin:

Here is a description of the quarters and condition of the insane at the almshouse of Kane County, not far from Batavia, and which is one of the best in the state. The examination of this institution was made by Dr. R. J. Patterson, well known as a former superintendent of various state hospitals for the insane. He reports fifteen insane and six idiotic persons at that almshouse, which is a large and costly stone structure, utterly unfit, however, to become the receptacle for the violently insane. There are, for example, three strong stone cells—stone floors, sides and ceilings, *six by nine feet;* two of them with heavily grated windows; the other *without a window at all*, and all of them having heavy prison-like doors, and not one of them having a ventilating flue, or means for heating, even in winter, except a small register from a furnace, which *opens in a hall* into which the doors of the stone cells open. Open pails in each room receive the dejections of the patients, and all of them are cold, utterly cheerless and stinking. One insane man in one of these cells is a perpetual prisoner, being either locked up in his cell, or if taken from it to clean it or to give him an airing, he is handcuffed. In another room, 9 by 16 feet, three women are confined; one of them, the most violent, being chained all the while by an iron handcuff to a staple in the floor. This room is cold, cheerless and as badly ventilated as it could well be. They have ordinary poor-house fare, and all of them are pale, feeble looking persons, showing the effects of bad air, want of exercise and probably unsuitable nourishment; and they are, most of them, counted incurable, as well they may be, under such a system of management. It is needless to say they do not receive any

regular medical treatment. Let the reader imagine the life of such a patient, incurably insane!

Then again, take the example of the almshouse in Will County, in this state, near Joliet. In the rear of the dilapidated frame structure in which the sane paupers are lodged, is a low, dark, miserable room, 12 by 24 feet, partitioned off with board slats into stalls, hardly fit for beasts, and called the "calaboose," in which *ten insane persons of both sexes* are huddled together at night like hogs in a sty. During the day the insane males are removed to and confined in *a corn crib* near by. They have no medical attendance worthy of the name. But not to carry these disgraceful details any farther in this place, if we turn to the "Cook County Asylum for the Insane," things are so bad as to be inexcusable. The *building*, though a very good one, especially with the recent additions being made, could not be much worse located than it is, in a flat malarial district with but very poor opportunities for perfect drainage. Then again it continues to be, as in early times, a "department" of the poor-house, of which it was originally an offshoot, though it has now in magnitude and importance completely overshadowed the almshouse proper. In this case, by a specific rule (5th) of the commissioners, every officer of the institution—including the physician—*is subordinate to the warden*, who is simply a citizen, who gets the place as a reward for party service, and who is responsible simply to a political body—the aforesaid commissioners—and who can, *if he chooses*, do anything except order the kind of medicine for or pass a professional opinion on the sanitary condition of the patients. Here are *three hundred insane patients*—enough to stock a large asylum—subject to all the changes that the whirligig of modern municipal politics in this country can bring to them, in which the *selection of a physician* is left to a shifting board of commissioners, elected every year or so, and most of whom have no adequate conception of the real nature of the responsibility resting on them in such a case as the one under consideration. In the present case there is but one physician, and that one not only without an extensive experience in ordinary forms of disease, but totally devoid of that kind of special training that would fit

him to take charge of the nearly 300 insane that are lodged in the asylum. The present incumbent, who seems to be a well disposed young man, does probably the best he can under the circumstances; but take it altogether we do not hesitate to point to the system of management prevalent at the Cook County Asylum as wholly inadequate and disgraceful. The solemn and important interests of several hundreds of our fellow citizens, doubly unfortunate in the loss of their reason, in which they are incapacitated not only for securing, but even for recognizing their true rights or interests, are sacrificed at the feet of ignorance, petty political exigencies, and of systems of public beneficence which, either in their conception or execution, turn the thought of the sympathetic beholder to the dark ages.

But these references to local occurrences are not so much for local purposes, as to illustrate the necessity which exists in all its urgency, for a renewed effort to provide in a manner more in conformity with their needs, for the care of our insane poor.

Dr. Hammond, of New York, has relinquished his position as editor of the *Psychological and Medico-legal Journal*, his place being filled by Dr. Allen McLane Hamilton, of that city. At the same time the *Journal* has changed its form, and to a certain extent its name. It will henceforth appear as a quarterly and will be known as the *American Psychological and Medico-legal Journal.* It publishes quite a list of associate editors, located in different parts of the country, and altogether, in the change in its form and management, promises to not only sustain but increase its reputation and usefulness. It is with no ordinary pleasure that we witness such evidences of increased interest in neurological medicine as the character of this publication promises to afford.

This closes the second volume of the Journal, and the fact is mentioned only to say that its success has exceeded our most sanguine expectations, and that the prospects for the forthcoming volume could not reasonably be better. It will be possible henceforth to render the Journal more than ever worthy of the support of the profession.

Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

Functions of the Brain.—O. Soltmann, *Centralbl. f. d. Med. Wissensch.*, No. 14, offers the following as the conclusions deduced from a large number of experiments:

1. In newly born pups, electric excitation of the cortex causes no movement whatever.
2. It only can cause movements after the ninth to the eleventh day after birth.
3. The extent and the form of the motor centres of the cortex vary in young and in adult animals.

At the meeting of the Soc. de Biologie, July 10 (reported in *Gaz. Med. de Paris*), Dr. Eugene Dupuy offered the following communication:

1. In a vigorous adult dog, of medium size, I laid bare the brain in the middle portion by raising the cranial bones above the frontal and parietal convolutions on the left side, using the greatest precautions and losing very little blood. I divided the dura mater, laid bare by the removal of the bone, over a space as large as a fifty centimes piece, the animal being almost entirely under the influence of chloroform, and assured myself that the electro-faradic irritation of the exposed parts gave rise to very apparent movements in the members of the opposite side, that is the right side. Then with an olive-shaped cauterizing iron, heated to a white heat, I touched very delicately the exposed surface, acting on both the pia mater and the cerebral substance itself; the irritation of this part burned, by the same current as that previously employed, still gave rise to the movements observed before the cauterization. I re-closed the wound. The animal did not show, some hours later, when it had completely recovered from the effects of the chloroform, any trace of paralysis perceptible to observation. Nevertheless the pupil of the corresponding side was a little contracted and the eye ran slightly. Twenty-seven days later cicatrization of the wound was complete, and the dog showed no appreciable alterations of motricity or sensibility. I re-opened the wound and found that the cranial bone was in the process of regeneration. The dura mater, which had been divided by a crucial incis. ion, was cicatrized and adhered *en masse* to the new bone, and also to a slight extent a scar had formed over the spot cauterized. Irritation by a moderate faradic current from the end of the tongue to this cicatrix previously dried by blotting paper and tinder, the dog being anæsthetized, gave rise to

no motor phenomena in the members, while the same current applied in its neighborhood, and especially in front of and below the scar, caused movements of all the members of the opposite side. After successfully removing the cicatricial patch, which was rather firm and involved simply the nervous substance after the manner of a sclerotic patch, the cavity which contained it showed that it had been neither the seat of an inflammation nor of a softening, and was a little more than once and a half as large, and deep as a fifty centimes piece. I applied the current in this cavity, dried with care, without obtaining any movements, while the same current applied elsewhere caused them.

In all experiments on dogs, cats, Guinea pigs, and rabbits, I have always observed, even a long time afterwards, the brain to be the seat of a more or less limited, or more or less acute inflammation in the burned spot, excepting in this dog and in one Guinea pig, which gave me the results detailed above.

In this species it is presumable that the white hot iron scarcely injured more than the pia mater, and perhaps the immediately subjacent cortical layer. It is to be remarked that, as I observed in my earliest experiments in 1873, and as numerous other observers have noticed, if we burn or destroy the so-called psycho-motor or ideo-motor points, the animals, at the end of a longer or shorter period, show no paralysis, and if, after having destroyed these said points we irritate their sites with the faradic current we obtain the same movements as before. The experiment I relate, shows, it appears to me, that if we seek, many days after the operation of cauterization, to reproduce the movements by the faradic irritation of these points, we do not obtain them, although the point irritated has been the seat of an inflamma tion or apparent softening. Only the pia mater and the cortical layer were destroyed, and former observations have shown their destruction does not prevent the movements when they are excited immediately after the destruction of the so-called centres. I ask (and I avow that I am inclined to admit this hypothesis) if the movements we ordinarily see are not due, not to the irritation of the cortex, but to that of the vascular nerves of the pia and the numerous vessels of the part, irritation of which produces a brusque contraction of the blood-vessels. In the experiment related I do not believe that other parts were destroyed after the twenty-seven days elapsing between the two operations, than the pia mater, the cortical layer, and certainly the isolated nerves and those that accompany the small vessels of the pia mater and elsewhere, as far as I can be certain.

I shall continue my experiments, and I hope soon to have the honor of reporting to the society whether the hypothesis I have suggested is sustainable or to be rejected.

The following are the conclusions of a recent memoir by M. Bouillaud, presented to the Paris Academy of Sciences, July 19, as reported in the *Bulletin Gen. de Thèrapeutique:*

1. The cerebrum and the cerebellum together constitute a double organ, absolutely essential (in a purely physiological, not psychological sense) for all the acts over which preside the diverse faculties of the spirit or the intelligence.

2. As the cerebellum is the seat of the co-ordinating principle of the movements of progression and the various motions which appertain to them, so the cerebrum itself, without prejudice to its other functions, is the seat of the co-ordinating centres for the movements necessary in a great number of intellectual acts, and of the act of speech in particular.

At the meeting of the Soc. de Biologie, June 5 (reported in *Le Progrés Medical*), M. Lepine presented the results of experiments by MM. Bochefontaine, Tridon, and himself, on the effects produced by electric excitation of the motor parts of the nervous system. These experiments were performed on curarized dogs. There is a groove in the frontal lobes of these animals, known as the crucial groove, in front of which is the *pre*-frontal and behind the *post*-frontal convolution. In this last are three points that are motor centres for the superior and inferior members and the faces. If we excite the post-frontal gyrus by a *feeble* inductive current, we notice a considerable increase of arterial tension in the lower members. This increase of tension is also observed after excitation of the pre-frontal gyrus. This phenomenon does not appear at once—a certain time must elapse between the irritation and the increase of pressure. M. Lepine had observed not only vaso-constrictor but also vaso-dilator symptoms. He had, in fact, seen an elevation of temperature in the paw of the opposite side.

This is, moreover, what we observe after the excitation of a sensitive nerve. On the side of the heart, feeble excitation of these nervous centres caused an acceleration of its pulsations. After a strong one, on the other hand, they were slow. As regards the secretions, M. Lepine observed them notably increased by the irritation of other points, less accurately located than the preceding.

In reply to a query of M. Bert, whether, after section of the cerebral zone commenced and then replacing the severed portion, the experiment had been repeated, M. Lepine stated that it had been done, and that the mere operation of cutting caused also a rise in the arterial tension.

At the *seance* of the Soc. de Biologie, June 19 (reported in *Gaz. des Hopitaux*), M. Lepine made a short communication on the region of the brain, the excitation of which caused salivary hyper-secretion. Three times out of four, he found in the dogs experimented upon, that the faradization of the more anterior portion of the brain had for a result either to produce salivation in cases where it had been previously absent, or to increase it when the condition already existed. This point of the brain is directly in contact with the olfactory lobe. Other points in the anterior temporal region also increased the salivary secretion. But M. Lepine had not observed this phenomenon produced under the influence of excitation of the interhemispheric region, as some authors have stated. Such are the facts, as regards their interpretation. M. Lepine is very reserved, and at present only offers hypotheses.

At the meeting of July 3, M. Lepine made a communication on the action of excitation of the hemispheres on the respiratory movements. Excitation

of the anterior portion slowed and even arrested the movements, while that of the posterior portion had no effect in the dog, and even accelerated them in the rabbit.

In another communication, July 31, M. Lepine, starting from the fact before shown, that the excitation of the anterior portion of the hemispheres exercised a well-marked influence on the cardiac pulsations, had sought to determine whether that influence was transmitted to the heart by the pneumogastric of the same or the opposite side. It is well to remember here that in the experiments relative to the influence of the excitation of the hemispheres on the salivary secretion, MM. Lepine and Bochefontaine had seen the secretion equal on both sides, or greatest on the side of the hemisphere excited, while, as we know, the movements of the limbs are on the opposite side.

In a curarized dog M. Lepine cut one pneumogastric (the left), for example; he then laid bare the brain, and excited each of the two hemispheres with currents of equal intensity. But, while the excitation of the right hemisphere was followed by no appreciable effect, that of the left produced, with a moderate current, a slowing of the pulsations and a diminution in the height of the pulsations, registered with a bulb introduced into the cavity of the chest between the heart and the thoracic wall.

At the meeting of the Psychological Section of the British Medical Association, Aug. 6 (reported in *Brit. Med. Journal*), Dr. Lauder Brunton, in the absence of Dr. Ferrier, read the following summary of the results of some experiments lately performed by the latter investigator on monkeys. The method followed was the comparison of the effects of electrical irritation with those following localized destruction of parts of the brain, by means of the actual cautery or scalpel. The two sets of experiments supported and explained each other. The most important fact demonstrated was the localization of regions of special sense in the convolutions; and this, along with localization of centres of motion proper, served to clear up the true significance of the reactions to electrical stimulation. 1. Destruction of the frontal regions of the brain, which gives no reaction to electrical stimulation, is without effect on sensation or voluntary motion, but causes marked impairment of intelligence and of the faculty of attention. 2. Destruction of the gray matter of the convolutions bounding the fissure of Rolando causes paralysis of voluntary motion on the opposite side of the body, sensation remaining unaffected; while lesions circumscribed to areas previously localized by the author, caused paralysis of voluntary motion limited to the muscular action excited by electrical stimulation of the same regions. 3. Destruction of the angular gyrus causes blindness of the opposite eye, the other senses and voluntary motion being unaffected. This blindness is only of temporary duration, provided the angular gyrus of the opposite hemisphere remains intact. When both are destroyed, the loss of visual perception is total and permanent. 4. Destruction of the superior temporo-sphenoidal convolution abolishes conscious reaction to auditory stimuli, the other senses and voluntary motion remaining unaffected. The results of

destruction, taken with the effects of electrical stimulation of this region, indicate that it is the centre of auditory perception. 5. Destruction of the hippocampus major and the hippocampal convolution abolishes the sense of touch on the opposite side of the body. 6. Destruction of the *subiculum cornu ammonis*, taken with the results of electrical stimulation, indicates that this is the seat of the sense of smell for the same side of the body. 7. Destruction of the gray matter of the lower part of the tempora-sphenoidal lobe in immediate relation to the region of olfactory perception abolishes the sense of taste. 8. Destruction of the optic thalamus causes complete anæsthesia of the opposite side of the body. 9. Ablation of the occipital lobes produces no effect on the special senses or on the powers of voluntary motion, but is followed by a state of depression, with refusal of food, not to be accounted for by mere constitutional disturbance. In one case, which survived the operation three weeks and was then killed, the appetite returned; a phenomenon probably to be accounted for by compensatory association. The sexual appetite, however, was exhibited during the first few days after the operation, as judged by the behavior of the animal to a companion monkey. 10. Ablation both of frontal and occipital lobes in one monkey did not interfere with the powers of sensation or of voluntary motion.

In the discussion that followed, Dr. Dupuy, of Paris, gave an account of his own results, which differed from those of Dr. Ferrier. Dr. Caton, of Liverpool, who had been working independently on this question, confirmed Dr. Ferrier's statements, and said he was glad to find that the centre assigned by Dr. Ferrier to the sense of sight, was one which he had localized by an entirely different method, viz.: that of noting the variations in the electrical currents of the brain as caused by functional exercise.

Electrical Currents of the Brain. By Richard Caton, M. D., Liverpool. After a brief *résumé* of previous investigations, the author gave an account of his own experiments on the brains of the rabbit and the monkey. The following is a brief summary of the principal results. In every brain hitherto examined, the galvanometer has indicated the existence of electric currents. The external surface of the gray matter is usually positive in relation to the surface of a section through it. Feeble currents of varying direction pass through the multiplier when the electrodes are placed on two points of the external surface, or one electrode on the gray matter, and one on the surface of the skull. The electric currents of the gray matter appear to have a relation to its function. When any part of the gray matter is in a state of functional activity, its electric current usually exhibits negative variations. For example, on the areas shown by Dr. Ferrier to be related to rotation of the head and to mastication, negative variation of the current was observed to occur whenever those two acts respectively were performed. Impressions through the senses were found to influence the currents of certain areas, *e. g.*, the currents of that part of the rabbit's brain which Dr. Ferrier has shown to be related to movements of the eyelids were found to be markedly influenced by stimulation of the opposite retina by light.—*Brit. Med. Journal*, Aug. 28.

Equivalent Regions in the Brains of the Primates and other Animals.—Ad. Pansch, of Kiel, published (*Centralbl. f. d. Med. Wissen.*, No. 38) a communication in regard to the equivalent regions of the cortex in the primates and lower animals, in which, while admitting the existence of similar fissures in the brains of all animals, he takes issue with Hitzig and Betz in respect to certain of their conclusions in regard to this point. He has investigated the embryological development of the brain, and has traced the morphological and genetic relations of the principal sulci. He finds certain fissures—that of Sylvius, the fissure of Rolando, the sulcus interparietalis (Turner), and the sulcus præcentralis (Ecker)—to exist, at least in a rudimentary condition, in nearly all. That which was considered by Hitzig as the fissure of Rolando, Pansch thinks corresponds in its under half to the interparietal, while, in its upper part, it is the equivalent of no well-marked constant type. In regard to the *lobus paracentralis*, on which Betz lays so much stress, the author says it is genetically of no special significance, its limiting fissures being also extremely variable, and, in great part, of slight depth. The statement of Betz that the brain of the dog possesses no central convolution, is of course, denied, since the fissure of Rolando is morphologically represented, and the above-named convolution which it bounds, must, therefore, have its equivalent in the anterior end of the third and fourth convolutions of Leuret.

The author also finds that genetically homologous portions do not always possess in different animals the same finer structure or physiological significance, and *vice versa*. The conclusion to which he has been led in his embryological studies of the subject, is, that the sulci, their depth, etc., are more constant and important than the rather deceptive convolutions which they surround.

The Functions of the Lumbar Cord in the Dog.—Masius and Vanlairs, *Bull. de l'Acad. de Med. de Belgique*, No. 3 (abstracted in *Rev. des Sciences Medicales*).

It has been demonstrated by Goltz and by Gluge that, after the section of the spinal cord at the lower limit of the dorsal region, the mechanical excitation of the rectal mucous membrane has the effect of provoking rhythmic movements of the sphincter of the anus. The present memoir has for its object to determine, in an accurate manner, in the dog, the location of the nervous centre of the rhythmic movements of the anus; to show that the dilatation of the anus is active and connected with the raising of the tail: the contraction of the sphincter, on the other hand, coinciding with the lowering of that appendage; and, finally, to prove that the rhythmic movements of the anus and tail may be produced by direct excitation of the medullary axis. The experiments consisted in largely opening the spinal canal, dividing the lumbar cord at different heights, and provoking, in various ways, movements of the anus. They seemed to establish that a feeble excitation of the superior third of the lumbar cord causes an elevation of the tail and an active dilatation of the anus; that a moderate excitation of the middle third causes a contraction of the sphincter and a lowering of that organ. An intense irritation of the one or the other of these parts of the

cord frequently caused rhythmic movements of these parts, alternate dilatation of the anus and raising the tail, and contraction of the anus with lowering the tail. Irritation of the rectal mucous membrane provoked these rhythmic movements by reflex action. They ceased to appear after the destruction of the cord at the level of the inferior border of the middle third of its lumbar portion. In conclusion, the authors advance the opinion that the ano-spinal centre forms an essential part of the rhythmic centre.

Rapidity of Sensation.—Bloch, *Gaz. Med. de Paris*, June 5 and 12, gives the following results of his experiments as to the rapidity of the sensory nervous current in man:

1. The quickness of the sensory current may be tested exclusively by the sensations, without observing any other physiological phenomena.

2. The procedure is based on the greater or lesser degree of persistence of the sensation. If two shocks are successively received, one in each hand, they are simultaneously perceived when the interval between them is sufficiently short (averaging usually $\frac{1}{45}$ of a second).

3. The only possible explanation is the following: The sensation of the first shock still continues with an intensity sensibly equal to itself when the sensation of the second shock arrives.

4. This persistence appears to increase in duration the more rapid the shock, but in a feebler degree.

5. If, instead of on the second finger, we receive the second shock at a point nearer the sensorium, say the ala of the nose, we obtain the apparent synchronism with a greater interval between the shocks than when the two hands are used.

6. The difference of the two intervals measures the difference in the transmission from the hand and nose, respectively, to the sensorium.

7. Inversely, if we receive the shocks on the finger and on the toe, the interval needed to obtain the apparent synchronism should be diminished by the amount representing the difference of duration of the sensory transmission from the foot and hand, respectively, to the sensorium.

8. These calculations are based on a hypothesis that is confirmed by experiment. It is required that the reception of an impression on the skin should be sensibly equal for all the points submitted to shocks.

9. The phenomena so produced in fact, and the experiments which confirm them, establish that the persistence of a sensation increases according as the sensibility of the region excited diminishes.

10. The results of this memoir are based on an approximation of .0002 of a second.

11. They give us as certain and immediate conclusions the two following formulæ:

a. The quickness of transmission is greater in the cord than in the nerves.

b. The average rate, from all the experiments, without taking into account whether it was through the cord or nerves, is 156 metres (about 424 feet) per second.

12. The experiments made with the nose, the hand, and the feet, permit more exact estimates, and give as final results, taking account of the length of the nerves, the following rates of transmission:

In the cord, 194 metres per second.

In the nerves, 132 metres per second.

The Decussation of the Fourth Nerve.—S. Exner, *Sitzber. der Wiener Akad.*, LXX., 1874 (abstracted by Straus in *Revue des Sciences Med.*).

According to Stilling and Meynert, the fibres of the trochlear nerve decussate at the level of the valve of Vieussens—a singular thing among the motor nerves either cranial or spinal. Schroeder van der Kolk denied this decussation, and Exner, basing himself, not on microscopic examinations, the results of which are too open to question, but upon experiment, comes to the same conclusion. He irritated the valve of Vieussens by placing one electrode on the median line, the other one millimetre to one side. If the decussation actually occurred here, the current ought to cause movements of rotation of the two eye-balls; but this movement was only observed in the eye corresponding to the side excited, at least when the current was not too strong, and could not excite by diffusion the nerve of the opposite side.

Varying the experiment, the author divided (in the rabbit, as before), the tubercula quadrigemina, the valve of Vieussens, and the medulla, in the median line, and separated the two segments by an isolating lamina. Then he irritated the nucleus of origin of the patheticus (in the inferior tuberculum quadrigeminum) of one side, and produced contraction in the trochlear muscles of the same side.

These experiments appear, therefore, to confirm the theory of the non-decussation of the fibres of the trochlear nerve.

The Color of the Chameleon.—At the meeting of the Soc. de Biologie, July 17 (reported in the *Progrès Medical*), M. Bert reported some curious experiments on chameleons. He removed the right eye of one of these animals and then irritated it; the left side changed color, and the right followed suit very slowly. The other eye being also removed, the change of color occurred simultaneously. M. Bert removed the right hemisphere of another individual; the right anterior paw, although not paralyzed, remained pendant at the side as little used as the left corresponding one. After the ablation of the left hemisphere the animal resumed all its vivacity, and used the two limbs. It would appear that each hemisphere controls one-half of the body, and that in the chameleon we can presume the existence of two separate beings with distinct wills.

In answer to a question of M. Henocque, M. Bert stated that he had not yet studied the decussation of the optic nerves within the brain.

The Nervous System in the Respiration in Insects.—A note by M. E. Faivre was read at the meeting of the French Academy of Sciences, (reported in *Rev. Scientifique*) entitled : The Influence of the Nervous System on the Respiration in an Insect, the *Dytiscus Marginalis.* In 1860, M. Faivre

presented to the Academy a memoir in which he established that in the perfect state of dytiscus the metathoracic ganglion presides over the excitation and maintenance of the respiratory movements which the abdominal ganglia are incapable by themselves of maintaining. In 1864, M. Baudelot, operating on the larvæ of dragon flies, obtained a contrary result, namely, that the separation of the metathoracic ganglion from the abdominal ganglia did not abolish the respiratory movements. M. Faivre repeated his experiments of 1860, which have led him to the same result as before. Then remarking that the investigations of M. Baudelot, in experimenting on the larvæ of the libellulidæ, were under altogether different conditions than his own, the author of the present communication thinks that, in the more sedentary insects, all that concerns the apparatus and mechanism of respiration being under quite different physiological conditions, the action of the nervous system may be exerted upon this important function in an altogether different manner.

Recurrent Sensibility.—The following is the report of M. Claude Bernard on the investigations of MM. Arloing and Tripier in regard to the persistence of sensibility in the peripheral portion of divided nerves. We extract it from the *Gaz. des Hopitaux*, No. 81, July 13.

When a sensory nerve has been divided in a living animal, its peripheral end, separated from the nervous centre, ordinarily becomes insensible; nevertheless, this is not always the case, and Magendie first demonstrated, many years since, that after the section of the anterior sensible rachidian roots in the dog, sensibility remains in the peripheral portion, but is abolished on the central side of the cut. It is to this sensitive property of a divided nerve that Magendie has given the name of *recurrent sensibility.*

This study of this recurrent sensibility of the nerves is not only an interesting fact of experimental physiology, but this nervous property is still occasionally called in to assist in the interpretation of apparently enigmatical clinical phenomena. On many occasions, in man, the median nerve, accidentally divided, has been reunited by a suture, and soon after the operation partial sensibility has re-appeared in the parts to which the nerve is distributed. In order to account for these singular facts often noticed, many authors believe in a restoration of sensibility, which they explain by the hypothesis of an immediate reunion. MM. Arloing and Tripier have proved that this sensibility is due to peripheral nervous anastomoses.

It is by experiments on animals that MM. Arloing and Tripier have shown the *role* of these peripheral anastomoses. They divided the three collateral nerves of the toe of a dog, and found that sensibility was persistent at all points. They then divided the fourth nerve, and found that the analgesia became absolute. They further found that when we cut one of the cutaneous nerves of the hand, the two ends remain sensible, and that the sensibility of the peripheral end consists in a kind of borrowed sensibility, due to the presence of recurrent fibres, the existence of which they were able to demonstrate by observation of non-degenerated fibres in the peripheral portion a month after the section.

But it is particularly in some researches on the facial nerves, of a spec-

ial kind, that MM. Arloing and Tripier have shown the most remarkable talent in experimental analysis.

The recurrent sensibility demonstrated in various nerves of the dog by experiments of your reporter, has never been clearly shown in the rabbit and the horse ; and for the facial nerve in the latter animal, and the solipedes in general, it had been denied by M. Chauveau. Repeating these experiments, MM. Arloing and Tripier have shown that if, after section of the facial nerve below the parotid, we do not habitually find this recurrent sensibility in the peripheral portion, since at this horizon there are not ordinarily recurrent nervous fibres; but when the division is made lower down, nearer the termination of the nerve, the sensibility of the peripheral portion becomes very evident.

As regards the recurrent sensibility in the trigeminus, which exists, but is more difficult to demonstrate than for the facial, MM. Arloing and Tripier have found that it arises not only from the sensible nerves of the same side, but that it results also from an intercrossing or a recurrence of the sensitive nerves of the opposite side. This is the first time this important fact has been really demonstrated. In fact, MM. Arloing and Tripier have not only tested the phenomena of recurrent sensibility by skillfully performed vivisections, but they have also explained them by an attentive study of the degeneration of the two portions of the divided nerves in the animals they experimented upon. Thus their memoir is exceptionally valuable. They have reproduced all these degenerations in very well executed figures, exhibited to the commission.

The results of the great work of MM. Arloing and Tripier, of which we can only give in this place a summary analysis, may be stated as follows:

1. The facial and the spinal nerves of solipedes and rodents possess recurrent sensibility as well as those of the carnivora.

2. To find this recurrent sensibility the more easily, it is needful to seek it in the peripheral portion of the nerves.

3. The peripheral ends of the branches of the trigeminus are sensible. This sensibility is difficult to prove, but it nevertheless exists.

4. The peripheral ends of the nerves of the members are likewise sensible; nevertheless this sensibility may disappear as we ascend the nervous trunks.

5. In all cases the sensibility of the peripheral end is due to the presence of nerve tubes, the relations of which with the trophic and perceptive centres have not been interrupted by the section.

6. Absence of these tubes is connected with insensibility of the peripheral portion.

7. These tubes come from the fifth pair for the facial, from the neighboring nerves, and certainly from those of the opposed side for the sensory nerves, and from the neighboring and homologous nerves for the mixed ones.

8. These recurrent tubes ascend to a greater or less distance in the trunk of the nerve to which they pass; their number decreases in going from the periphery to the centre.

9. The return of these fibres may take place short of the termination of the nerves. That, however, is the point where it occurs in general.

En résumé, MM. Arloing and Tripier have generalized recurrent sensibility in all the mammalia; they have given the phenomenon a decisive demonstration and a rigorous explanation by the aid of a series of the most delicate experiments by vivisection, performed on a great number of animals during a period of over six years.

The commission are therefore unanimously in favor of according a prize of experimental physiology to MM. Arloing and Tripier.

Influence of Cold on the Reflex Acts.— At the session of the Soc. de Biologie, July 24 (reported in *Gaz. des Hopitaux*), M. Tarchanoff recalled a previous communication in which he had shown that the apparently paradoxical action of cold on the reflex acts was due to an alteration of the blood; it now remained to see what that alteration might be.

We know that chilled frogs have the blood very red. This red coloring is due to the presence in the blood of a large quantity of oxygen, whence M. Tarchanoff deduced the hypothesis that super-oxygenated blood ought to augment the reflex activity. This was still to be demonstrated. To do this he had introduced a great quantity of oxygen into the blood of certain animals by the method of M. Bert, and then examined the reflex acts; this had shown that the hypothesis was altogether false; instead of obtaining an increase of reflex activity by this method, he had found, on the contrary, a progressive diminution. It was necessary therefore to abandon this theory and seek another explanation.

Since the oxygen in the blood had nothing to do with the production of these phenomena, he conceived the idea of examining another element in the blood, namely, the carbonic acid. He had seen that a very small amount of carbonic acid in the blood caused a very sudden decrease in the reflex activity. But very red blood contained very little of this agent, the quantity being in an inverse ratio to the height of its color, and in these cases therefore, it is the diminution of carbonic acid that heightens the reflex activity. M. Tarchanoff therefore modified as follows the hypothesis he had proposed to explain the action of the blood on the reflex activity under the influence of cold: it is not on account of the increase in contained oxygen, but rather on account of the diminution of the amount of carbonic acid in the blood that causes an exaggerated reflex activity under the influence of cold.

Physiological Action of Light.—At the meeting of Section D, of the Brit. Med. Association, at Bristol, August, 1875 (reported in *Brit. Med. Jour.*), Dr. J. G. McKendrick read the report of a committee appointed in 1873 to investigate the physiological action of light. The members of the committee were Prof. Balfour, of Edinburgh, Prof. Dewar, of Cambridge, and Dr. McKendrick. The results arrived at are as follows: 1. The impact of light in the eyes of mammalia, birds, reptiles, amphibians, fishes, and crustaceans, produces a variation amounting to from 3 to 10 per cent. of the normal electro-motive force existing between the surface of the cornea and

the transverse section of the optic nerve. 2. This electric variation may be traced into the brain. 3. Those rays that are regarded as most luminous produce the largest variations. 4. The electrical alteration is due to the action of light on the retinal structure itself, as it is independent of the anterior portion, eliminating therefore the natural supposition that the contraction of the iris might produce a similar result. It is possible by experiment to discover the physical expression of what is called in physiological language "fatigue." 6. The method employed in this research may be applied to the investigation of the special organs of the other senses. One of the principal difficulties in arriving at the exact relation between the electrical variation and lights of different luminous and color intensity was the continually diminishing sensibility of the retina to the stimulus, owing to the abnormal condition of the eye when separated from the body and deprived of blood. This difficulty was overcome by placing the animal under the influence of woorara or hydrochloride of chinoline, both of which substances deprived the animal of sensation and motion; thus experiments can be made upon the living eye without removing it from the body or in any way injuring the animal. It was found that, on applying the electrodes of the galvanometer to the cornea and to the surface of the skin, large deflections were obtained, sensitive to light, and showing a remarkably constant alteration. In the early part of the investigation it was found that sometimes the initial effect of light was to produce an increase, and at other times a diminution of the natural current circulating through the optical apparatus, but no explanation was then offered as to the cause of this apparent anomaly. It has now, however, been demonstrated by a large number of experiments, that the variation is related to the primary direction of the currents. If, for instance, the cornea be positive to the surface of the brain, the initial effect of light is an increase; if, on the other hand, some portion of the brain be positive to the cornea, the initial action is a diminution of the natural current, thus showing that the current, superadded or induced by the action of light, is always in the same direction, only in one case it is added to, and in the other substracted from, the natural current. The committee also examined the action of polarized light and of the various colored rays of the spectrum, with the result of showing that in all cases the yellow rays produced the greatest effect. They have also found that the extreme violet rays and the low red rays produced no alteration. The committee then attempted to measure accurately the electro-motive force of the living eye. This they did by means of Mr. Latimer Clark's method of the comparison of electro-motive forces. From a large number of observations it has been found that the electro-motive force of the nerve currents dealt with in these experiments on the eye of the frog amounts to about $\frac{1}{350}$ of a Daniells cell. This was compared with the electro-motive force of the muscle and nerve of the frog; the muscle gave about $\frac{1}{35}$, while the nerve gave $\frac{1}{480}$ part of a Daniells cell. Lastly the committee made a series of experiments with a chronograph to determine the time required for the action of light upon the eye of the frog. It was found to occupy about $\frac{1}{10}$ of a second, thus agreeing very remarkably with the conclusions of continental physiologists as to the time occupied in its action on the human eye. The result of this investigation

shows the same electrical variation from the action of light occurs in the eyes of all members of the animal kingdom.

The following are some of the recent papers on the anatomy and physiology of the nervous system that have appeared in medical periodicals:

Laycock, A Chapter on some Organic Laws of Personal and Ancestral Memory, *Jour. of Mental Science*, July; Bernhardt, On the Water Contents of the Human Nervous System, with some experiments as to the influence of the constant current on the same, *Virchow's Archiv*, LXIV., 3, 297; Huizinga, Researches in Regard to the Innervation of the Vessels of the Natatory Membrane of the Frog, *Pfluger's Archiv*, XI, 4 and 5; Pflueger and Van Platen, On the Influence of the Eyes on Tissue Change, *Ibid* (2 papers); Flechsig, On the Development of the Central Nervous System, *Centralbl. f. d. Med. Wissensch.* No. 40; Eichhörst, On the Development and its Form-Elements, *Virchow's Archiv*, LXIV., 4, 425; Urbantschitsch, On a Peculiarity of Auditory Sensations of Slight Intensity, *Centralbl. f. d. Med. Wissensch.*, No. 37.

---

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

Muscular Atrophy in Sciatica.—L. Landouzy, *Archives Gen. de Med.*, April, May, 1875 (abstracted by H. Huchard in *Revue des Sci. Med.*).

Atrophy of the muscles in sciatica has been observed in different degrees of frequency by different authors. According to Landouzy, the atrophy which he has noticed in the painful members seems to affect the muscles, and them alone; what proves this is, that, in his observations, the skin has either the same thickness or an unequal thickness, the inequality being in favor of the painful member. This cutaneous thickening is of great importance, since in cases where the atrophy of the muscles is only slight it may mask it entirely.

If, in many cases, the atrophy has been recognized after a long period of suffering, it still sometimes comes on rapidly, as in a case where it appeared only fourteen days after the first pain. In all cases it is not in the long duration of the pain that we are to seek the cause of the atrophy, since there are patients in whom it appears soon after the pain, and others who suffer for a long time without any diminution of the volume of the affected leg. We cannot also invoke, as a cause, the inactivity of the affected member, for it is in these cases that the patients execute the most movements to

relieve their sufferings. As to the theory of reflex action, it has been refuted by M. Vulpian. (See his preface to Weir Mitchell's book.)

Consequently we are forced to admit that this atrophy is due to some modification in the physiological activity of the nervous elements with the muscles, some modification of the trophic influence of the nerves on the muscles. It is thus that we observe atrophies whenever the relations between the nerves and muscles are broken off or even only diminished.

We have to admit in the dystrophic sciaticas an alteration of the branches innervating the muscles. This alteration may be caused by cold as well as by lead intoxication (saturnine neuritis). Moreover, this clinically suspected nervous lesion has been histologically recognized. Finally, cases of neuritis have been admitted for other nerves: Weir Mitchell recognized in his observation No. XIII. (p. 130) a neuritis of the sciatic; M. Lasègue reports an example of neuritis of the cubital, in which the patient, though relieved, presented, nevertheless, an atrophy of the muscles of the inside of the fore-arm, the thenar and hypo-thenar eminences. (*Thesis de Borne*, 1874.) In the observation No. 130 of Duchenne he treats of a paralytic neuritis of the radial *a frigore.*

Basing himself on these clinical and anatomico-pathological differences which distinguish certain cases, M. Landouzy describes separately the neuralgic and the neuritic sciaticas.

The first are characterized by pains that come on suddenly and with all their severity. These pains are lancinating, with alternations of calm and increase. With rest the pain ceases, to re-appear again in its intensity under the influence of any effort or movement. Palpation of the nerve-trunk reveals no change in its volume. No disorders of nutrition, however great the acuteness and duration of the sufferings. The pains disappear and re-appear quite rapidly.

In neuritic sciatica the beginning is slow and insidious, the patient complains of embarrassment, of heaviness in the thigh, before the appearance of the acute pains; the first period of the painful manifestations is still compatible with labor and fatigue on the part of the subject. Then lancinating pains come on, accompanied with a dull, heavy feeling along the trunk of the nerve. This pain continues, with exacerbations, and is increased by pressure on the nerve, which is felt to be more voluminous than usual. It is in this form that muscular atrophy occurs. There are two kinds of pains worthy of notice in the patient:

1. The intermittent pain—acute at the points of emergence; called by Cotugno sciatic spasm.

2. The persistent pains—severe, and located all over the posterior surface of the thigh.

This distinction between the two kinds of sciatica has been already made by Lasègue (*Arch. Gen. de Med.*, 1864), and M. Landouzy reports twenty-six cases of sciatic neuritis. In observation XIII., the patient presented a slight œdema of the affected limb; in another case, M. Dumontpallier has seen a group of vesicles along the track of the musculo-cutaneous nerve in an individual suffering from an intense sciatica.

The muscular atrophy that follows these neuralgias gives way, according to Bonnefin (*Thesis*, 1860), under the influence of exercise of the member

and medication, which should consist especially in the use of the continuous current.

The treatment of the neuritic sciaticas ought to be thus directed: In the beginning, leeches *in loco dolenti* for the inflammatory phenomena, and the continuous current for the muscular atrophy.

SYMPTOMS OF HÆMORRHAGE AND EMBOLISM.—Dr. Ottomar Gelpke. *Archiv der Heilkunde*, XVI., 5 and 6, August, 1875, offers the following as a brief statement of the points to be kept in mind in the diagnosis of cerebral hæmorrhage and embolism, as indicating the one or the other:

FOR APOPLEXY.	FOR EMBOLISM.
Atheroma of the arteries.	Youth.
Hypertrophy of the left ventricle.	Previous articular rheumatism.
Contracted kidney.	Cardiac valvular deficiency.
	Previous disease which might lead to formation of clots.
Emphysema.	
Intemperance or other debilitating habits.	
Prodromal phenomena.	Complete absence of prodromata.
Incomplete paresis.	Extensive muscular paralysis.
Ataxic aphasia.	Amnesic aphasia.
Symptoms of cerebral pressure.	
Indications of cerebral congestion during the attack.	
	Symptoms of other arterial embolisms.
Disappearance of the residual disorders after a moderate time.	Very rapid or quite imperceptible disappearance of the residual disorder.
Involvement of the intelligence.	Striking retention of earlier mental power.
Reaction stage.	

No one of these symptoms is pathognomonic by itself; but in combination with others each is of importance.

The author gives a lengthy discussion of the subject of the diagnosis of these two accidents, and a number of pages of tabular analysis of published cases.

Hæmorrhage in the Cerebellum.—The following are the conclusions of a recent thesis by F. Carion on the diagnosis of cerebellar hæmorrhage, as abstracted in the *Rev. des Sci. Medicales*. They are based on a great number of observations, many of which have not been published.

The predominating symptom of cerebellar hæmorrhage is general enfeeblement of the muscular system.

Hemiplegia is relatively rare; when it exists it is sometimes crossed, sometimes direct.

Facial paralysis is exceptional; it involves the orbicular muscle of the eyes, and occurs on the side of the lesion; it has for its cause the compression of the seventh pair at its point of emergence.

The tongue presents a certain degree of asthenia, shown by a weakness in its movements without deviation.

Strabismus, like the facial paralysis, is not observed as a symptom of cerebellar origin; it may occur from compression of some one of the motor nerves of the eye.

The conjugated deviation of the eyes has been observed; it always occurs toward the uninjured side as for other parts of the encephalic isthmus.

The pupils are sometimes dilated — more frequently contracted; they sometimes react under the influence of light, and are sometimes insensible.

General sensibility is unaltered even when hemiplegia exists; we barely observe a slight anæsthesia in a few rare cases; hyperæsthesia is still less frequent.

Troubles of special sensibility, principally of sight, have been observed, but they are very rare exceptions.

The intelligence is generally preserved in all its integrity.

Vomiting is scarcely ever absent, and it can rightly be deemed one of the more characteristic symptoms of cerebellar hæmorrhage.

Contractures.—The following is from a notice of a recent thesis (*Des Contractures*) on contractures by Dr. Straus, and is taken from the *Progres Medicale*, June 19. The author only includes in his thesis: 1. The contractures connected with disorders of the cerebro-spinal axis; 2. The hysterical contractures; 3. Those due to diseases of the muscles and nerves, with the partial contractures; 4. Reflex contractures; 5. Contractures in diseases caused by intoxication; 6. Tetany.

1. The cerebral disorders which give rise to permanent contractures are numerous. M. Straus studies only those that are clearly circumscribed in particular parts (hæmorrhage, softening). But in this order of diseases, there are two kinds of permanent contractures, the one precocious, the other slow in development. The early contractures, more common in cases of hæmorrhage than in softening, indicate not only a lesion of the white substances or the corpus striatum, but a lesion located in the protuberance, the medulla, the peduncles, and in the ventricles; they may appear at the same time as the apoplectic stroke, and the prognosis is grave.

The slowly developing contracture appears insidiously one or two months after the onset of the disorder, commencing in the hand, and thence extending to the corresponding members in which deformities are produced (flexion

or extension). Not only circumscribed lesions are capable of producing these permanent contractures; a unilateral atrophy of the brain may give rise to this symptom; nevertheless the deformities that result from these two causes are quite different, for while we see in the one angular protuberances around the distorted joints, in the others we observe on the other hand, a round smooth outline to the articulations, which perhaps undergo an atrophy of the osseous terminations, in which the subcutaneous tissue does not participate.

M. Bouchard, in 1866, using the works of Turck, MM. Charcot and Vulpian and his own researches, has described the anatomical cause of these researches, resulting from a consecutive lesion of the cord, a lesion which proceeds from the diseased hemisphere down to the lumbar cord, passing across the decussation of the affected pyramids in the corresponding bundle. But this secondary degenerative lesion does not rise indifferently from all the primitive cerebral lesions; it takes place especially when the hæmorrhage is situated in the corpus striatum or the internal capsule, an important fact in the localization of cerebral maladies, since the alterations in the optic thalami, the centrum ovale, or the gray matter of the convolutions does not give rise to descending myelitis.

Permanent contractures are also met with in affections of the cord, and are then nearly always allied with a symmetrical sclerosis occupying the posterior part of the lateral columns.

These conditions may occur in all the chronic alterations of the cord, and we can therefore pass in review all the affections of the spine with this symptom of permanent contraction. Primary or secondary transverse myelitis (Pott's disease), multiple sclerosis, progressive muscular atrophy, hypertrophic cervical pachymeningitis (so true is it that systematic lesions can, as Charcot has remarked, extend themselves and invade other tracts than those primarily affected), infantile spinal paralysis, etc., may become complicated secondarily with this symptom of permanent contracture. Sometimes this symptom comprises the whole disease, and the contracture is then symptomatic either of a lateral protopathic sclerosis, or a lateral amyotrophic sclerosis, the lesion, at first limited to the lateral bundles, invades secondarily the great motor cells of the gray substance of the anterior horns.

2. Hysteric contractures. Leaving out of consideration the transitory contractures, M. Straus, faithful to the programme he has laid out for himself, studies only the lasting hysteric contracture, taking place in severe and confirmed cases of the disorder, following an attack, and affecting muscles already paralyzed or anæsthetic, and taking on different types: hemiplegic, paraplegic, diplegic and partial contractures. The progress, the direction and the termination of these contractures are studied; pathological anatomy is itself enriched with a case related by M. Charcot of a contracture, at first temporary, then permanent, of the four limbs, in which the professor observed a symmetrical fasciculated sclerosis of the posterior part of the lateral columns and the anterior roots of the spinal nerves, It is therefore possible to refer this hysterical symptom to a lesion. Will it also be allowable to suppose that the functional lesion that causes the curable contracture in hysterical patients, is located in the region of the antero-lateral columns of the cord?

Though transient, it may become permanent, whence the incurable hysterical contractures.

3. As regards contractures connected with disorders of the muscles and nerves, and the partial contractures, we need only cite, without any deeper analysis: those due to muscular inflammations—psoitis for example—those from ischæmia of a muscle (*claudication intermittente*), the contraction of the facial muscles consecutive to paralysis from cold (theory of Hitzig), those from traumatism and injuries to nerves, and those occurring in cases of zona.

4. Next comes the enumeration of the reflex contractures, altogether too numerous for us to pass them all in review, the type of which, however, is the contracture consecutive to an arthralgia of the coxo-femoral articulation; and we may cite, in the same rank, the contraction of the nuchal muscles in sub-occipital disease, blepharospasm in ulceration of the external angle of the eyelids, conjunctivitis, the contraction of the sphincter in fissure of the anus, the professional cramps, writers' palsy, etc., etc. Are the deformities of nodular rheumatism due to the influence of the arthralgia on the peri-articular muscles?

5. Next come the contractures in the disorders by intoxication: convulsive ergotism, the acrodynia of casernes, and scurvy, occupy the first rank. Finally tetany, the study of which completes the work, and which seems to be connected with a transitory disturbance of the intra-medullary circulation.

Sclerosis of the Posterior Columns with Atrophy of the Right Hand and the Right Half of the Tongue.—M. Cuffer presented to the Soc. de Biologie, June 12 (reported in *Gaz. Med. de Paris*), the case of a man, 52 years of age, suffering from the symptoms of locomotor ataxy, inco-ordination, neuralgic pains, loss of muscular sense, and inability to walk or stand with the eyes shut, to which were added also a slight atrophy of the thenar muscles of the right hand and a well marked atrophy of the right half of the tongue. The parts of the nervous system involved, besides the posterior columns, were evidently the nuclei in the medulla of the hypoglossal and the motor root of the trigeminus. It must be considered, therefore, as a case of posterior sclerosis in which the morbid process encroached upon the anterior horns to affect the hand, and continued upward into the medulla to cause the atrophy of the tongue.

The Relation of Constitutional Diseases to Hereditary Psychoses.—Wille, *Corresp. Blatt f. Schweiz. Ærzte*, April 15 (abstracted in *Rev. des Sci. Med.*).

As regards the element of heredity in the psychoses we can divide the subjects into four groups.

1st group. Descendants of parents affected with mental or nervous disorders, and bearing from birth or from early infancy the marks of an abnormal cerebral organization and presenting the functional disorders dependent upon it.

2d group. Children of similar parents, but developing normally for a longer or shorter series of years; reaching even the highest degree of devel-

opment their organization is capable of, but then becoming the victims of encephalic disorders.

3d group. These present no psychic or nervous abnormality during their lives, but their progeny are destined to morbid cerebral conditions.

4th group. Offspring of parents affected with mental or nervous disease, who nevertheless remain healthy, themselves and their descendants.

In the first group the connection is plain. The trouble in the children is to be considered as the continuation of that of the parents, developed by direct transmission.

In the second group two varieties: 1. The appearance of the mental disorder is in connection with external occasional causes (puberty, involution, alcoholism).

2. The mental disorder appears without appreciable internal or external cause. We may explain these cases by saying that these children have inherited, not the disease itself, but a particular predisposition to mental disease.

In those cases where no tangible cause exists to put into action this predisposition, we must look elsewhere.

The author relates the history of six patients, the issue of insane parents, who themselves became insane without any appreciable cause; their affection had a notable tendency to end in intellectual debility. All these patients offered symptoms of constitutional disease (two cases of pseudo-hemicrania, two of scrofula, one of phthisis, and one of chronic rheumatism). As the mental disorder followed, step by step, the development of the other morbid phenomena, we are compelled to admit that there existed an intimate relation between these concomitant affections and the psychoses, consisting in that these constitutional disorders, inherited as predispositions and remaining for a long time latent, have none the less produced an alteration of nutrition affecting the nerve elements, an alteration which may finally give rise to psychical disease.

Dr. Wille is therefore convinced that mental disease may be transmitted hereditarily by the aid of constitutional affections. This view takes into account the cases of alienation ranked in the second subdivision of the second group. Besides the diseases already mentioned we should take note of the part played by the hereditary dispositions toward anæmia, chlorosis, and very probably also, arthritism, syphilis, and osteo-malacia.

The study of heredity in mental affections gains much by this view of the facts. In place of considering the concomitant maladies as mere complications of insanity, they are placed to it in the relation of cause to effect.

The same remarks will be applicable to the third group, since the *rôle* of heredity is there quite as obscure. It is not sufficient to merely admit the latency of the mental disease, to render the subject more clear. Wille, on the ground of several observations, is still disposed to recognize here the influence of a latent constitutional disease.

The fourth group, finally, finds perhaps its best explanation in the fact of fortunate cross-marriages.

Arsenical Paralysis.—At the *séance* of the Soc. de Biologie, July 17, (reported in *Le Progrès Medical*) M. Scolosilof read a communication on

paralysis from arsenic. He had studied the subject in his service at Moscow. The symptoms most constantly found are a well pronounced muscular atrophy—alterations of all kinds of sensibility, and finally trophic disorders. Analyses of the different tissues have shown that arsenic is found very little in the muscles, but largely in the liver, and especially in the nervous centres.

DIFFERENTIAL OPHTHALMOSCOPIC SIGNS OF COMMOTION AND CONTUSION OF THE BRAIN.—M. Bouchut offered the following note to the *Acad. des Sciences* of Paris, July (reported in *Bull. Gen. de Therap.*):

"Whenever an individual falls on his head, loses consciousness and seems paralyzed, we have always to enquire whether his condition is due to a transient loss of function, due to commotion of the brain, or whether, on the other hand, there does not exist a contusion and compression of the nervous substance by a sanguine or serous effusion.

"The ophthalmoscope, employed by me for this purpose first in 1865, gives us very important results.

"If there is only a commotion of the brain, the optic nerve preserves its form, its clearness and its usual colors, and the retinal veins, with the retina itself, show no abnormal modification.

"If a contusion of the brain exists, with or without consecutive inflammation, or if there is a serous or sanguine effusion, with or without fracture of the cranium, the optic nerve and retina partake in the disorder; the optic nerve is swollen, seems flattened, is of a uniform rosy tint, sometimes more vascular than normal; its contour is less clear, and it is the location of a partial or general serous suffusion, which extends to the neighboring parts of the retina under the form of a transparent opaline tint, which obscures to a greater or less degree the papillary border.

"The arteries are sometimes diminished in volume if the suffusion has extended to the sheath of the optic nerve, and the more or less dilated retinal veins indicate, by the disturbance in their circulation, more or less disorder in the circulation within the brain."

LOCOMOTOR ATAXIA.—At the meeting of the Soc. de Medicine of Paris, April 10 (reported in *Gaz. des Hopitaux* No. 71), M. Onimus made the following statements in a discussion in regard to this disease. M. Peter had spoken of a case in which it appeared to be dependent on sexual excess. M. Onimus said, "I do not agree with the opinion of M. Peter. Generally the subjects of ataxia are not given to sexual excesses. Heredity is a frequent cause. Three brothers of my acquaintance are ataxic in different degrees. Moreover, there are numerous varieties of this disease; the ataxia characterized by atrophy of the optic nerve, with slight neuralgic lancinating pains; that which affects the bladder, with titubation and the same kind of pains; that form which is accompanied with gastric disorders, without titubation, etc. The prognosis is also different; in patients that do not show the general phenomena the accidents progress with more slowness, but after each new crisis the affection suddenly developes a greater gravity, more and more disquieting. I am able, thanks to electricity, to prognosticate whether an

ataxia will be severe or not; whether its progress will be rapid or slow. Whenever, in a patient treated by the constant current, I perceive at the negative pole (and this even when a feeble current is employed) a sort of inflammatory patch with bullæ, I consider that I must form a very unfavorable prognosis."

Inco-ordination of the Ocular Movements in Connection with Cerebellar Lesions.—At the meeting of the Soc. de Chirurgie, Paris, May 12 (reported in *L'Union Medicale*), M. Panas related two cases in which he had observed a more or less complete loss of co-ordination of the movements of the eyes in individuals presenting symptoms of serious cerebral trouble. In one case there was a complete loss of movements of horizontality of the two eyes, with preservation of those of elevation and depression of the eyelids. In the other case there was absolute immobility of the two orbits.

At the autopsy no lesion of the cerebral lobes or the mesocephalon could be detected, but there did exist an alteration of the cerebellum, especially of the vermis inferior. There had evidently been a meningo-encephalitis, followed by softening and adhesion of the meninges to the cerebellar substance. It is singular to find disorders of the visual functions coinciding with simple cerebellar lesions. M. Panas suggests the question as to the connection of the cerebellum with the co-ordination of the eyes. The experiments of Ferrier which seemed to indicate this function of that organ are strongly supported by these observations.

Medullary Lesions from Injuries to Nerves.—At the meeting of the Soc. de Biologie, July 10 (reported in the *Gaz. Med. de Paris*), M. Hayem made a communication relative to the alterations in the cord caused by nerve injuries. He had previously shown that the laceration of a nerve caused a myelitis, affecting especially the gray substance, and having a tendency to propagate itself downwards as well as upwards from the point which corresponded with the root of the injured nerve. Simple section of a nerve gave rise to the same results.

In these two cases the alterations of the gray substance have a tendency to become generalized not only on the same but also on the opposite side.

Nevertheless the nervous lesions just indicated do not necessarily give rise to a myelitis; in certain cases the only appreciable alteration is an atrophy of nerve cells in the tract where the injured nerves end; in other cases, on the contrary, it produces an acute myelitis, which rapidly causes death.

M. Hayem explained these facts by admitting that the irritation provoked by the traumatism may propagate itself along the whole length of a nerve and into the cord.

He has sought to complete these results by new researches. First, he sought to find whether, by varying the experimental lesions, he could not alter the spinal lesions, and he undertook a new series of experiments to decide this question. He has, therefore, contused the nerves by rubbing them roughly between the points of a pincette; he has sought to produce an

irritation in these organs by contact with bromide of potassium crystals, or by pricking them with needles dipped in nicotine.

He finds that, by these different procedures, we cause the development of a medullary phlegmasia, more intense and more extended than in his earlier experiments, and in its march also more rapid; one month after the operation the phlegmasic alterations in the opposite half of the cord could already be distinguished; they did not continue limited to the gray substance, but had encroached on the white, and they presented great analogies with those observed in acute myelitis in man. The myeline tubes contained granular masses, the cylinder axes were swollen and in the process of granular disintegration; their alteration could be followed into the roots of the nerves as well as into the gray matter. It was especially in the periphery of the cord that the granular axis cylinders were met with, and, if we consider that there is nearly always a concurrent meningitis, we may reasonably ask whether these alterations of the nerve elements are not consecutive to those of their envelopes.

It appears, therefore, that the irritation of the nerves propagates itself gradually to the cord by means of their connective tissue.

In his former experiments M. Hayem had observed the laceration of a nerve to be followed by a peri-meningitis, the dura mater being doubled by a layer of embryonal tissue.

In the lesions provoked by the chemical irritation he had found lesions of the pia mater and the arachnoid. These researches will be continued.

In answer to a question of M. Claude Bernard, M. Hayem stated that he had only observed epileptiform accidents following these lesions, similar to those noticed by Brown-Sequard in similar conditions, but they were not constant, and were lacking after chemical irritation. Trophic troubles were also absent, while they had appeared in a very high degree of intensity under a lesser irritation of the nerve.

M. Bernard had observed, after the laceration of the posterior spinal roots in the frog, convulsions similar to those from strychnia. The facts stated by M. Hayem permitted the supposition that these convulsions were due to a myelitis induced by the nerve lesion.

M. Hayem had seldom observed facts of that kind, but he had frequently seen the phenomena of myelitis. In one case, when he lacerated the roots of the second cervical pair, a paralysis of the four members ensued; in other cases contractions and atrophy of the muscles of the side opposite the lesion were produced.

M. Charcot said that these experiments appear destined to clear up certain facts of spinal pathology, in which we see lesions propagate themselves from their primitive location to other parts of the cord. Let us consider, for example, infantile paralysis: We are aware that in this affection the muscular atrophy is dependent upon a sclerotic alteration of the anterior cornua; ordinarily, the lesions once produced, do not extend themselves; the locomotor troubles and the amyotrophies persist without showing any tendency to invade new regions, or to become aggravated; sometimes, nevertheless, we see it give rise ulteriorly to spinal troubles foreign to the symptomatology of the primitive affection. Thus, in a man affected with an

infantile paralysis limited to the left upper member, there comes on an enfeeblement of the right arm, with atrophy of the muscles of the right shoulder. It is not a remnant of the paralysis, since the morbid symptoms have presented neither the evolution nor the special characteristics of that affection. There exists a muscular atrophy attacking the homologous groups to those affected by the infantile paralysis. It appears, therefore, that in this case the ancient alteration has at last provoked a pathological process which extends horizontally from the gray horn originally affected to that of the opposite side.

We may also cite, in this connection, the history of a patient whose thigh had been amputated, in whom there was first produced spasmodic action and numbness in the thumb, and next paralysis of the right leg and of the bladder.

It is probable that in this case, as well as in the experiments of M. Hayem, the traumatic inflammation of the nerves is propagated to the cord.

We know, finally, that in certain cases of ataxia the lesions, developed primitively in the radicular bundles of the posterior columns, gain the anterior cornua in following the track of the sensitive roots.

In the presence of these facts we can explain the pathology of the spinal cord in the following manner: There are simple and complex forms of myelitis. In the simple forms the lesions are limited either to the posterior, the lateral, or the anterior columns; they constantly offer the same symptomatology. The lesion of the anterior horns produces atrophy of the muscles innervated from the affected parts. Lesions of the posterior radicular bundles induce motor inco-ordination. Those of the lateral columns reveal themselves by paresis, by tremors, spontaneous or provoked, and by lasting contractions; they alone among the spinal lesions can give rise to this assemblage of functional disorders. In the complex forms the lesions, at first localized in one of the regions we have enumerated, propagate themselves to other parts of the cord, and we then see arise the same symptoms which follow the alterations of these parts in the simple form—as might be expected, since these symptoms do not appertain specially to such or such a disease of the cord; they indicate merely the localization of the lesions in a determined region of that organ.

Epileptic Tremor of the Lower Extremity in Certain Nervous Disorders.—The following is an abstract of a communication made by M. Geoffroy to the Societé de Biologie, July 31, as given in the *Gaz. des Hopitaux:*

M. Geoffroy first observed that this phenomenon was not new, and that it to-day is known to all clinicists.

Nevertheless, two German pathologists, MM. Erb and Westphal, having recently published memoirs, the conclusions of which are different from the notions at present held, M. Geoffroy desired to make known some facts not in accordance with their views. First, he would take, for example, the case of a patient now under the care of M. Charcot. It was a young man twenty-five years of age, who for four years had suffered from an acute myelitis, showing itself in a complete paraplegia, with trouble in the bladder and

rectum. During this period there was at times notable amelioration, with again relapse with phenomena of rigidity and contracture, and at present the patient presents the following general condition: Complete loss of motility of the two lower members, diminution of cutaneous sensibility, paralysis of the bladder and rectum, contractures of the lower members, with tendencies to flexion, and energetic adduction of the knees together. In this patient the epileptic trembling of the lower limbs could be easily perceived by roughly raising with the palm of the hand the point of the foot and the toes. The foot then is agitated by very limited rhythmic movements, and often when the point of the foot is kept raised the movements become more extensive and more rapid, and are propagated to the leg and thigh.

Up to the present time this symptom has been considered as a reflex act, produced in consequence of a greater excitability of the cord; an excitability the causes of which may be multiple, such as various excitations of the skin, the muscles, nerves, etc.; or still more by a cerebral excitation, having for a cause some violent emotion for example. In lowering the point of the foot by a reverse motion, we arrest this epileptic movement.

In the first movement (raising the toes) we have a convulsion produced by excitation of the cord, following an irritation of the nerves of the toes or of the muscles of the calf, incited by the lifting of the point of the foot. In the second movement (lowering the foot again) we arrest this convulsion, also by excitation of the cord following an irritation of the nerves of the toes, or of the flexors of the foot on the leg, which is produced by lowering the foot.

These facts are still unexplained and even apparently contradictory, since muscles innervated by branches of the same nerve, the sciatic, act differently from what is to be expected. And the problem becomes still more complex if we add that excitation of the muscles of the posterior thigh, likewise innervated by the sciatic, do not give rise to epileptic trembling; and further, that we cannot produce this phenomenon in the foot except when the knee is forcibly extended; and finally, *per contra*, a fact not before noted, we can produce the phenomena of spasmodic tremor in the gluteal muscles. Therefore, in the muscles supplied from the sacral plexus there are some, the excitation of which gives rise to epileptic tremor (gluteal muscles and those of the calf), and others, the excitation of which causes a cessation of this epileptic tremor, or hinders its production (muscles of the antero-external region of the leg). It is necessary to add that this phenomenon can also be produced on the muscles supplied by the crural nerve, which arises from the lumbar plexus.

This is the state of the case in a physiological point of view. M. Charcot has long since studied it clinically, and M. Geoffroy proves this by many citations from the thesis of Dr. Dubois, written under the auspices of M. Charcot (*Thesis de Paris*, 1868, Etudes sur quelques points de l'ataxie locomotrice progressive). By the side of the *saltatory* variety of epilepsy, M. Charcot places the *trembling* variety, in which the attack is composed of a series of tetanic jerks, with stiffness of the inferior members. M. Charcot, moreover, in his lectures insists that we observe this epileptiform trepidation not merely in cases of contracture due to sclerosis of the lateral columns, since it has

been observed also in cases of hysterical contracture. This, however, is much the rarest of the two.

The epoch at which this phenomenon of epileptiform trepidation was first observed is difficult to fix. It is mentioned in French and English publications within the last twenty years.

M. Geoffroy next reviews the ideas of MM. Erb and Westphal.

The proof that we do not have here a reflex act starting from the skin, says M. Westphal, is that if we pinch or otherwise excite it at the level of the knee, we do not produce in the thigh either a tremor or even a simple muscular contraction. If, on the other hand, we percuss with a little hammer a little above the knee on the quadriceps tendon, we produce a contraction of that muscle, and in predisposed individuals an epileptic trembling. M. Westphal seeks in the same way to demonstrate that we do not excite a reflex action starting from the articulations or from the bone.

M. Geoffroy, while recognizing the correctness of the experiments of M. Westphal, does not accept his conclusions. It is incontestable that in many cases a very slight excitation of the skin may give rise to this phenomenon of trembling. M. Geoffroy cites numerous cases, among others that of the patient above mentioned, in whom convulsions were produced under the influence of an excitation starting from the skin.

He regards as established the following facts: 1. That, contrary to M. Westphal's opinion, an excitation of the cutaneous nerves may give rise to the symptom of epileptiform trembling of the lower limbs. 2. That the percussion of the tendo Achilles is not an infallible means of arousing this phenomenon.

Unilateral Phenomena of Mental and Nervous Disorders.—Dr. Alex. Robertson read a communication on this subject at the late meeting of the British Medical Association, which is thus reported in the *Brit. Med. Journal.* Aug. 28 :

"After some preliminary observations, unilateral mental phenomena were first considered. These consisted of illusions and hallucinations, and possibly, also, of the peculiarities supposed to be due to the separate and independent action of the hemispheres. The observations of French writers were specially noticed. Cases of one-sided hallucinations of hearing were quoted from Goll, Griesinger and Schroeder van der Kolk. But these cases appeared to be nearly exceptional in the experience of these observers. The writer then submitted the results of his examination of 250 insane patients, both in respect to these and other sensorial or psycho-sensorial disturbances. Of thirty-four patients who entertained clear and well-defined illusions or hallucinations of one or other of the senses, in five "voices" were heard only in the left ear, and in five others in the left ear more than in the right; in one they were audible in the right ear alone; and in two they were stated to be more distinct in that ear than the other one. The disorders of the other senses were then referred to, and afterwards details of the cases of unilateral auditory hallucinations were given. The phenomena were most apt to occur in the milder and more ephemeral forms of insanity, and particularly when it had been caused by strong alcoholic

liquors. The frequency with which the hallucinations were associated with the left ear was very striking, and it was pointed out that the cases quoted from the above named authors were also on the left side. The pathology of the phenomena was then considered at some length, and also the indications derived from modern research in the anatomy, physiology and pathology of the nervous system as to their anatomical seat. The seeming dual action of the hemispheres was then illustrated. Thereafter, unilateral motor phenomena were discussed, the observations being restricted to the convulsive class; and a number of conclusions were stated, some of which were published by the writer in 1869. First, convulsive movements may begin in different parts of the body in the same case, even though there is no reason to think there is any appreciable change in the cerebral lesion. Second, in unilateral convulsions, the so-called bilateral muscles are often implicated, but the twin muscles of the otherwise sound side in most cases do not contract so firmly as those on the side first convulsed. The physician may, therefore, often ascertain for himself, in a case of general convulsions, the side on which the convulsive movements first began (and consequently the hemisphere affected), by firmly grasping the limbs of the two sides, and comparing the degree of firmness of their respective muscles. Thirdly, there may be *alternate* conjugate deviation of the eyes during the same convulsive seizure. Fourthly, as a general rule, the higher up the lesion is situated the more apt the convulsions are to become bilateral. Fifthly, when convulsions begin on one side, there is frequently a distinct and sometimes a prolonged interval before consciousness is involved; and it is occasionally retained throughout the whole seizure. Sixthly, there is a decided increase of temperature in the convulsed members. All these conclusions were illustrated by cases. With respect to unilateral sensory phenomena, it was submitted that there seems less disposition for the "irradiation of sensations" from one to both sides, than for the extension of one-sided into general convulsions. The greater regularity of the motor than the sensory symptoms was also dwelt on and illustrated. In surveying the different classes together, it was observed that one-sided disorders of motion and sensation had their analogues in unilateral hallucinations, and just as the partial might become general in the one case, they might also do so in the other. A striking illustration of the gradual merging of illusions of vision into insanity was submitted. Lastly, some observations were made on the irregularity in the order of succession of these phenomena as compared with normal physiological sequences."

"In the discussion which followed M. Dupuy referred to his own experiments on the effects of cauterizing one cerebral hemisphere, in which he had found paralysis of the same side of the body as a result; while a subsequent cauterization of the opposite hemisphere appeared to have a counteracting effect, the paralysis then disappearing."

The following are the titles of some of the recent articles in this department:

Paul Baumgarten, On Syphilis of the Cerebral Arteries, *Archiv der Heilkunde*, XVI., 5 and 6, Aug., 1875; Livi, The Pathological Anatomy of

Progressive Paralysis (continued article), *Rivista Sperimentale di Freniatria*, I., 4 and 5, 1875; MORSELLI and TAMBURINI, Contributions to the Experimental Study of the Physical and Moral Degeneration of Man (continued article), *Ibid;* GUTTMAN, On the Pathology of the Cervical Sympathetic, *Berliner Klin. Wochenschr.*, No. 3; F. FISCHER, Two Cases of Neuritis, *Ibid*, Nos. 32 and 33; JASTROWITZ, On the Pathology of Hemiplegia, *Ibid*, No. 31; BRUNS, On the "Mal Perforant du Pied," *Ibid*, Nos. 30, 31 and 32; ERB, On a Little Known Spinal Disease, *Ibid*, No. 26; JOHNSON, Lectures on Some Nervous Disorders that Result from Overwork and Mental Anxiety, *Lancet*, September; STARK, Microcephalism, Fœtal Encephalitis, and Amyloid Degeneration of the Brain, *Allg. Ztschr. f. Psychiatrie*, XXXII., 3 and 4; HOESTERMANN, On Secondary Progressive Paralysis. Observations from the psychiatrical clinic of Prof. Meynert in Vienna, *Ibid;* WITKOWSKI, On Cardiac Affections in the Insane, *Ibid;* HUGHLINGS JACKSON, On Syphilitic Affections of the Nervous System, *Jour. of Mental Science*, July; NICOLSON, The Morbid Psychology of Criminals (conclusion), *Ibid;* J. J. BROWN, Two Cases of Apoplexy of the Pons Varolii, with Remarks on Syphilitic Disease of Arteries of the Brain, *Ibid;* ACH. FOVILLE, *fils*, The Traveling or Migrating Insane; A Clinical Study of Certain Cases of Lypemania, *Ann. Med. Psychologiques*, July; MARET, Curious Observation of Two Similar Cases of Insanity, *Ibid;* SEMAL, On the General Sensibility and its Alterations in Melancholic Affections (2d article), *Ibid;* BALMER, Disorders of the Skin in Progressive Muscular Atrophy, *Archiv der Heilkunde*, XVI., 4; LANDGRAF, A Report on the "Casuistik" of Skin Diseases, with Relation to their Vaso-Motor Genesis, *Ibid;* DRESCHKE, A Communication on Lyssa Humana, *Ibid;* SCHOEN, On the Value of Ocular Disorders in the Diagnosis and Localization of Gross Cerebral Disease, *Ibid*, XVI., 1; BENEDIKT, On the Pathological Anatomy of Lyssa, *Virchow's Archiv*, LXIV., 4.

c.—THERAPEUTICS OF THE NERVOUS SYSTEM AND MIND.

EFFECTS OF DRUGS UPON THE INTRACRANIAL CIRCULATION.—Dr. J. M. Fothergill made before the physiological section of the British Medical Association, at its last meeting, a communication, the following general abstract of which is reported in the *British Med. Journal*, August 28:

Dr. Fothergill stated that, in producing effects upon the intracranial vascularity, there were two factors: (1) a direct effect upon the circulatory system; and (2) an effect upon the cerebral cells by which they attracted more blood or less blood to themselves. These factors existed in varying proportions in different drugs; and according to the exigencies of each case,

one or the other agent should be chosen, as opium in cases of insomnia from pain; chloral hydrate rather when the sleeplessness takes its origin in a high blood pressure. Whether the agent administered depresses or stimulates the nerve centres, its action can usually be intensified by giving it along with drugs which act directly upon the circulation, as opium with antimony and quinine, which affects the encephalic blood-vessels; with digitalis, which raises the blood pressure generally.

MONOBROMIDE OF CAMPHOR.—M. Bourneville, in a communication to the Acad. des Sciences of Paris (reported in the *Revue Scientifique*, September 4), stated the following facts in regard to his investigations on the monobromide of camphor. His experiments were performed on frogs, Guinea pigs, rabbits, and cats, to whom the drug had been administered hypodermically. The results obtained could be thus summarized: (1) Monobromide of camphor diminishes the number of the cardiac pulsations and causes a contraction of the auricular vessels; (2) it diminishes the number of the respirations without affecting their rhythm; (3) it regularly lowers the temperature; in fatal cases this decrease continues to the end. Thus, in cats, the temperature has been observed to fall from 39° C. (= 102.2 F.) to 22° C. (= 53.6). In animals which recover, an elevation of temperature to the normal figure succeeds this decrease, but it requires a longer time to bring about this result than was expended in the reduction of temperature. (4) Monobromide of camphor appears to possess incontestable sedative properties; (5) it produces no disorder in the digestive functions, but its long-continued use causes, at least in cats and Guinea pigs, a rather rapid loss of flesh.

As regards the therapeutic effects of the drug, they are worthy of remark. Among the diseases in which it has been tried and found to give satisfactory results, the author mentioned especially the cardiac affections of nervous origin, asthma, cystitis of the neck without catarrh, and, finally, cases of epilepsy in which vertigo existed simultaneously with the attacks.

CURARE.—The following is the *resumè* of the conclusions of a recent memoir on the action of this substance by Dr. J. Steiner, of Halle, and published in *Reichert u. DuBois Reymond's Archiv*, No. 2, 1875:

1. "The paralytic action of curare on fishes is exerted

a. On the central organs of voluntary motion,

b. On the respiratory centre, and

c. On the motor nerves.

2. "This action is not simultaneous, but corresponds in order of time to the above rubric, *a*, *b*, and *c*, the earliest effect being shown on the centres of voluntary movement.

3. "The paralysis of the motor nerves occurs much later than in the higher amphibians, birds and mammals; nevertheless, the transition to the fishes is not abrupt, but gradual through different species on either side.

4. "The development of the paralysis of the motor nerves is slower with the increase of size of the fish, without reference to the size of the dose.

5. "In the electric ray the paralysis of the electric nerves takes place much later than that of the motor nerves.

6. "The other rays and the sharks are affected by the poison similarly to the fresh water fishes.

7. "The reasons for the phenomena of 3 and 4 are still unknown.

8. "In the crustacea paralysis from the poison takes place, but relatively more slowly than in the fishes.

9. "In the mollusca, the star-fishes, and the holothurians, paralysis of the centres for voluntary motion also takes place.

10. "In the medusæ, according to the very few observations, the poison seems to have no action.

"Still further investigations are needed to establish

1. How far the effects observed in fishes are extended in the higher vertebrates, amphibians, birds, and mammals.

2. To establish a comprehensive theory of the action of curare that shall explain at once all the various phenomena and also the apparent contradictions in the different observations.

"The preliminaries of this investigation have been already undertaken."

These conclusions, as far as they go, seem to conflict with the views expressed by Vulpian that the action of curare is on the terminations of the motor nerves and not on the cerebral centres.

Picrotoxine.—Dr. Planat (of Vollore Ville) in a very remarkable memoir, crowned by the Acad. of Medicine, has studied the action of the alkaloid extracted from the Levant grains, the fruit of a menispermoid from India (Cocculus tuberosus). The following are the principal phenomena caused by the administration of picrotoxine:

Numerous experiments have been performed on various animals; picrotoxine has been absorbed by the digestive tube and the subcutaneous tissues. The results produced by these two methods are nearly identical as to intensity. The mollusca are shown to be relatively refractory; nevertheless, certain varieties succumbed to the drug applied subcutaneously. Representatives of the other classes of the animal kingdom were always susceptible to the effects of this agent. We can sum up, therefore, the action of picrotoxine on the muscular, cardiac, and vascular functions, on the sensibility, and on the spinal reflex power.

The *muscular system* of the life of relation is rapidly affected by small doses; whether strong or feeble, they invariably produce as a primary phenomenon a general torpor. Tonic convulsions, especially in the extensors, progressive paresis, and motor inco-ordination, are secondary phenomena.

Circulatory System.—Slowing of the cardiac pulsations by small doses, before the first convulsion. As soon as that occurs the heart ceases to beat, or rather only pulsates with difficulty during its duration, taking on again its rhythm, which decreases in number and force directly on account of the convulsions.

Capillary Circulation.—The arrest of the blood takes place more or less completely from the first convulsion, soon becoming decidedly apparent, although the heart still continues to beat, but with constantly diminishing intensity.

Sensibility and Reflex Movement.—Correlative with the muscular manifestations. Thus, dull in the earlier period, they become greatly exalted in the convulsive phase, and are abolished entirely when the final collapse occurs.

Lymphatic System.—The muscles and nerves of organic life seemed unaffected, as evidenced by the persistent activity of the lymphatics and the intestinal movements.

Brain.—Not at all affected.

Conclusions.—1. Picrotoxine acts especially on the myelencephalon.

2. This action spares the brain and affects principally the medulla, the cerebellum, and the cord.

3. It is characterized by the super-excitation of their elements, whence arises an exaggeration of their functions and a functional deviation, followed in its turn by paralysis from excessive expenditure of nerve force.

4. The most remarkable consequence of this functional super-activity is the more or less complete arrest that takes place in the circulation (action of picrotoxine on the pneumogastric and the depressor nerve of Cyon); whence it follows that picrotoxine is before all a cardio-vascular agent.

Therapeutics.—The tincture of Levant grains (1 part to 4 of alcohol 90 per cent.) has been employed conveniently with picrotoxine (granules of $\frac{1}{10}$ milligramme). The maximum dose is never above three milligrammes. As to the tincture, we have always commenced with one drop morning and evening in a teaspoonful of water, increasing the dose daily until it reaches from sixty to seventy drops a day in an adult. The quantity of the vehicle ought also to be increased with the dose, but it should not exceed a third or a half a tumbler for the higher dose.

The affections treated by this medicine, with incontestable success, are epilepsy, sympathetic and essential, chorea, infantile eclampsia, and painful contractions of the extremities.—(*Jour. de Therap.*, No. 10, *et seq.*, 1875). —*Bull. Gen. de Therap.*

Croton Chloral.—Dr. Von Mering, after a careful experimental and clinical investigation of the therapeutic value of this substance, gives his conclusions as follows:

"Croton chloral hydrate, which does not act by virtue of its decomposition into dechlorallyl, influences, like chloral, the apparatus of respiration and circulation. It is a weaker and less certain hypnotic and anæsthetic than chloral, and is not to be preferred to morphine in neuralgia. Special care is advisable in its employment in cases where the heart is affected."

Gelsemia.—Dr. J. Ott, *Phil. Med. Times*, July 31, offers the following as the conclusions drawn from his experiments as to the physiological action of gelsemia:

1. In cold-blooded animals it paralyzes first the sensory ganglia and then the motor ganglia in the central nervous system. This order is reversed in warm-blooded animals.

2. It diminishes the pulse and pressure.

3. This decrease of pulse rate is due to lessened irritability of the excito-motor ganglia of the heart.

4. The fall of pressure is due to diminution of cardiac irritability and vaso-motor tonus.

5. It decreases the respiration through a paralyzing action on the respiratory centres.

6. It dilates the pupil.

7. It reduces the temperature.

Dr. Ott's experiments were performed on frogs, rabbits and kittens. He appends a brief statement and analysis of nine cases of poisoning by gelseminum in the human subject, showing a complete analogy between the symptoms observed in these, and those experimentally produced in the lower animals.

Digitalis.—Dr. Bernheim, taking up and discussing the new theories invoked to explain the action of digitalis on the heart, and in particular that of Traube, shows that digitalis acts at the same time on the moderator system and on the cardiac contractility. In moderate doses the action of the muscles interferes with the effect on the excitation of the vagus, and in spite of the slowing of the heart its labor is increased. In toxic doses it is also the action on the muscle that predominates in the majority of cases; the heart is arrested in systole while the vagi have not yet lost their irritability. In some rarer cases the heart is arrested and death occurs in diastole (Vulpian, Megevand); it appears that then the influence on the vagus predominates.

As regards the action of digitalis on the vaso-motors, experiments are lacking to justify a positive opinion.—*Bull. Gen. de Therapeutique.*

Mechanism of the Action of Quinine on the Circulation.—Dr. Vincent Cherone has made at the Musèum d'Histoire Naturelle some very interesting experimental researches on the action of quinine on the circulation. He shows that, as Giacomini has stated, quinine is a powerful hyposthenisant; it lowers, in fact, in small doses, the arterial tension, and reduces the systolic force of the heart. The following are the conclusions in full of Dr. Cherone:

1. *Quinine causes the arrest of the heart in a diastole, greater than the normal and the cadaveric diastole.* This arrest does not depend upon direct action on the innervation of the heart, for when this is suppressed in part or in whole, it has no effect on the action of quinine.

2. *Quinine acts on the cardiac muscular fibre, and causes arrest in diastole without destroying its contractility.* Besides the separate contraction of each muscular fibre, or of the muscular bundles separately by a violent electric excitation, the contractility is shown by the action of the venom of the toad which revives the movement of the heart, and causes its arrest in systole. We believe, therefore, that quinine acts on the extensibility, causing a change in the molecular arrangement with a new disposition of the primitive muscular elements.

3. *Quinine favors the diastole in the same manner as it causes the dilatation of the vessels.* Dilatation of the vessels by quinine is primary and active, and does not depend on an action on the vaso-motors, for in destroying the innervation of the vessels of the ear of the rabbit (auricular branch of the cervical plexus, branch of the fifth pair and the sympathetic), we also obtain it.

4. *Quinine acts on the muscular fibres of the vascular coats in such a way that its action is the greatest where that histological element is most abundant.* We have seen, in fact, that the action of quinine on the circulation, in order of importance, is first on the heart, then on the medium sized arteries, and last on those of smaller calibre. The great arterial trunks feel only the hydraulic results of the action of the heart.

5. *We can obtain a dilatation of the vessels, even after the complete paralysis of the constrictor nerves, in such a fashion that we are compelled to admit that it is active in the true sense of the word.* We have indeed admitted, as was said before,[3] that the dilatation of the vessels consequent on excitation of the dilator nerves, may include paralysis of the vaso-constrictors, but our experiments, while confirming the general physiological law that the nerve acts always on the muscles and never on other nerves, have demonstrated that we can have a primary and active dilatation of the vessels in the true sense of the word.—(*Gaz. Hebdomadaire*)—*Bull. Gen. de Therap.*, Aug. 15.

CHLORAL.—Wyrzykowski, *Pomietnik* T. L. W. III, 1874, 289, (abstracted in *Virchow & Hirsch's Jahresbericht*) reports two cases in which chloral had been employed for a considerable period for whooping-cough in children, and in which there ensued salivation, swelling of the gums, and tumors in the cavity of the mouth. In one of these cases an eruption also made its appearance on the face and back. Discussing the experiments of Djuberg, and the observations of Brady, Gordon, Brown, Smith and Kern, the author comes to the following conclusions:

1. That chloral hydrate, employed for a long period, strongly affects the nutrition.

2. That this disturbance of nutrition especially affects the mucous membranes and the skin, and gives rise to various eruptions and swellings.

3. That it may come about in two ways,—indirectly by paralysis of the vaso-motors, and directly through the influence of the dissolving action of the chloral on the red blood corpuscles.

4. That this action of chloral hydrate is more severe on persons suffering from nervous diseases, on the insane and the mentally weak and paralytic.

ACONITIA.—Lewin, *Inaug. Diss.*, Berlin, 1875 (abstracted in *Allg. Med. Central-Zeitung*), lays down the following propositions as to the action of aconite on the heart:

1. That aconitia belongs to that class of cardiac poisons, the lethal action of which may possibly be counteracted by continued artificial respiration, provided this is kept up a sufficient length of time.

2. That the anomalies which appear in the heart's activity in cases of aconite poisoning, do not depend on an affection of the medulla.

3. The apparently contradictory results of experimentation may be classed in two groups, both of which involve a lesion of the ganglionary centre, but different in the fact that one group appears when the vagi are intact, and the other when they are paralyzed.

4. The integrity or paralysis of the vagus depends on whether the intracardial terminations are slowly irritated or immediately paralyzed.

5. This difference, which is practically an individual one, also appears in curarized animals, and is not peculiar to the poison.

6. The frequently observed arhythmy of the pulse is explained by the non-simultaneous and unequally strong action of aconitia on one or the other of the cardiac centres, and perhaps it depends also on the unequal distribution of the poison in the blood.

THE PHYSIOLOGICAL ACTION OF THE CHINOLINE AND PYRIDINE BASES.—The following are the general conclusions of a paper by Dr. J. G. McKendrick and Professor James Dewar, read before the British Medical Association at its late meeting, on the physiological actions of two series of bases derived from the distillation of quinine, cinchonine, or strychnine, with caustic potash, or from coal tar. The conclusions are copied from the abstract in the *Brit. Med. Jour.*, August 28.

1. There is a marked gradation in extent of physiological action of the members of the pyridine series of bases, but it remains of the same kind. The lethal dose becomes reduced as we rise from the lower to the higher.

2. The higher members of the pyridine bases resemble in physiological action the lower members of the chinoline series, except (1) that the former are more liable to cause death by asphyxia, and (2) that the lethal dose of the pyridines is less than one-half that of the chinolines.

3. In proceeding from the lower to the higher members of the chinoline series, the physiological action changes in character, inasmuch as the lower members appear to act chiefly on the sensory centres of the encephalon and the reflex centres of the cord, destroying the power of voluntary or reflex movement; while the higher act less on these centres, and chiefly on the motor centres, first, as irritants, causing violent convulsions, and at length producing complete paralysis. At the same time, while the reflex activity of the centres in the spinal cord appear to be inactive, they may be readily aroused to action by strychnine.

4. On comparing the action of such compounds as $C^9 H^7 N$ (chinoline) with $C^9 H^{13} N$ (paravaline, etc.), or $C^8 H^{11} N$ (collidine) with $C^8 H^{15} N$ (conia from hemlock), or $C^{10} H^{10} N^2$ (dipyridine) with $C^{10} H^{14} N^2$ (nicotine from tobacco), it is to be observed that the physiological activity of the substance is, apart from chemical structure, greatest in those bases containing the larger amount of hydrogen.

5. Those artificial bases which approximate the percentage composition of natural bases are much weaker physiologically, so far as can be estimated by amount of dose, than the natural bases; but the kind of action is the same in both cases.

6. When the bases of the pyridine series are doubled by condensation, producing dipyridine, parapicoline, etc., they not only become more active physiologically, but the action differs in kind from that of the simple bases, and resembles the action of natural bases or alkaloids having a similar chemical constitution.

7. All the substances examined in this research are remarkable for not possessing any specific paralytic action on the heart likely to cause syn-

cope; but they destroy life either by exhaustive convulsions, or by gradual paralysis of the centres of respiration, thus causing asphyxia.

8. There is no appreciable immediate action on the sympathetic system of nerves. There is probably a secondary action; because, after large doses, the vaso-motor centres, in common with other centres, become involved.

9. There is no difference, so far as could be discovered, between the physiological action of bases obtained from cinchonine and those derived from tar.

Dr. McKendrick also described the physiological effects of various methyl and ethyl compounds of chinoline. He alluded to the researches of Professor Crum Brown and Dr. Thos. R. Fraser on the action of methyl and ethyl strychnia as examples of a complete change in physiological action being produced by a change in chemical constitution. He and Professor Dewar had found the ethyl and methyl compounds of chinoline to have an action very different from chinoline alone. They were found to be much more active than chinoline alone, and to produce effects similar to those of the higher members of the chinoline series. He then indicated the important considerations suggested by this investigation; and said it was not too much to anticipate that the chemist may yet be able to build up compounds having effects resembling those of such valuable remedies as quinine, morphine, etc. Dr. Pye Smith said it was gratifying to find that so important a branch of science was being investigated by two such eminent men as Dr. McKendrick and Professor Dewar. Some of the bases to which reference had been made would, no doubt, prove useful medically and physiologically, especially in the latter capacity With regard to cinchonine, he had made some experiments with it on the human frame; and he was led to the conclusion that the farther it was kept from patients the better it would be. It certainly was cheaper than quinine, but it had many objectionable characteristics. He was glad to hear of the promised advantages of chinoline, which, if realized, would help them out of the difficulties attending the administration of woorara to the mammalia.

Hypodermic Injection of Morphia in Insanity.—The following is an abstract from the *Brit. Med. Journal* of a paper by Dr. McDiarmid, before the British Medical Association, August 6 :

After some preliminary remarks the author spoke of the superiority of the hypodermic to the stomachic administration of morphia. The physiological reasons were the greater exactness of the dose, the easy administration in rebellious patients, and the unanimous consent of experimenters. The usefulness of hypodermic injection of morphia in insanity was commented on, and its use in melancholia, acute mania, recurrent mania, chronic mania and general paralysis was illustrated by cases. The habits of filthy dements were improved under the hypodermic treatment. There was delayed action in some patients. Constipation was not caused by this method of giving morphia. Vomiting after subcutaneous injection was not frequent. Hypodermic injection of morphia was not suitable in maniacs suffering from heart disease, and was to be employed only as a *dernier ressort.* The use of atropia in combination with morphia subcutaneously was

described; also the dose of morphia required in the various forms of insanity. The results obtained by this method were compared with those of cannabis indica, chloral, bromide of potassium, and opium and morphia by the mouth.

Dr. Clouston, in the discussion of this paper, said the effects of morphia, in cases of insanity, might be divided into three classes: first, what might be called its specific effect on melancholia; secondly, its quieting effect in cases of mania; and thirdly, its sleep-producing effect in all cases. In regard to the first of these—the specific action of morphia in melancholia—he performed a number of experiments some years ago, treating the patients with morphia, and administering doses of from half a grain to two grains. During the progress of his experiments, he had weighed the patients every week, had taken the temperature of their bodies, and had their diet carefully attended to. He did not administer the morphia hypodermically, but he supposed that, so far as its special effect on melancholia was concerned, that was of little account. The result of his observations was not in accordance with those of Dr. McDiarmid. Of twenty-two patients with whom he had experimented, the great majority lost weight during the treatment, while the appetite at the same time seemed to diminish. In only three of the cases was there anything like that effect following the dose which had been so much lauded by various writers. Then again his experiments as to the quieting properties of morphia in cases of mania were certainly neither more hopeful nor more satisfactory than those connected with melancholia. In nearly every case, indeed, he found that the dose took away the appetite of the patient; and for this reason he did not consider morphia so beneficial as bromide of potassium and other remedies. In regard to the mere sleep-producing effect of the morphia, he thought the chief objections to it were the dryness of the mouth that was apt to be experienced in the morning, and the excitement occasionally brought on instead of sleep. On the whole, the results of his experiments in relation to the action of morphia were such that he had almost universally discontinued its use. Dr. McDiarmid pointed out that the results spoken of by Dr. Clouston might be attributed to the fact, that that gentleman had administered about three times as much morphia as had been done in the experiments which he had conducted.

Nitrite of Amyl.—At the *seance* of the Soc. de Biologie, June 5 (reported in the *Gaz. des Hopitaux*), M. Bourneville read a communication in regard to some features of the action of nitrite of amyl and on its employment in the treatment of epilepsy.

The nitrite of amyl, given by inhalations to animals, produces at first slackening of the pulse and respiration; next they return to the original figure and finally pass it. Sometimes if the dose is too strong, the diminution in number of the pulse and respirations becomes more and more pronounced, the temperature lowers one or two degrees (centigrade) and the animal succumbs. If the inhalation is made progressively with intervals, during which the animal respires freely, the temperature descends 8 or 9 degrees (?) below the primitive figure; the lowering continues one or two hours after the administration, then ascends and passes by one degree the original figure.

Simultaneously we observe a violaceous tinting of the palpebral mucous membrane, of that of the lips, and the tongue, and the buccal mucous membrane; the vessels of the ears dilate considerably, the ears become warm, and this increase of heat persists for a considerable time. If, by chance, the animal (or the patient) has a wound, a hæmorrhage takes place from it during the inhalation. The meningeal vessels are dilated (McBride). All these phenomena are limited to the head and neck. On account of this limitation, we are led to believe that the action of this agent is limited to particular regions of the nervous system. In animals, from the first inspirations we see a tetanic rigidity, generally transient, and then some tetanic convulsions of the paws. In man, as M. Bourneville has many times observed on himself, there is frontal cephalalgia and vertigo, accidents that ordinarily quickly disappear. The urine of patients, collected within twenty-four hours, examined by MM. Bourneville and Regnard, with one exception never presented any trace of sugar, a fact contradictory to the opinion of various authors.

Nitrite of amyl has been employed in epilepsy by Crichton Brown, Weir Mitchell, Philip, McBride, etc. All agree in recognizing that the inhalation of this agent arrests or anticipates the attacks in cases of epilepsy where an aura is present. It is not the same as regards the course of the malady. While according to some the attacks are made less frequent, others say that they occur as often as before the use of the agent. In the state of *mal epileptique*, made known through the researches of M. Bourneville, it is truly of advantage.

Nitrite of amyl is a useful agent to arrest the attacks of hystero-epilepsy, which often continue several hours. In severe hysterical or hystero-epileptic patients of M. Charcot at the Saltpetriere, the author is assured that the nitrite of amyl has never failed to cut short the crises, which do not appear again within twenty-four hours. The inhalation gives rise to the following phenomena: redness, at first vermilion, then becoming more and more violaceous, of the face, the lips, the buccal mucous membrane, and the neck. If while the inhalation is momentarily suspended, an attack comes on, the physiognomy of the patient becomes almost frightful, the congestion induced by the attack adding itself to that due to the medicine. When the patients return to consciousness the face is of a leaden pallor. Some have nausea, the majority have disorders of sight; they see yellow snow, sparks, green and yellow circles, and some say that the figures of persons around them are yellow and black. There remains a cephalalgia, different from that which they ordinarily experience after an attack, a slight stupefaction, etc. The progress of the disease is not modified, the attacks are just as frequent.

M. Bourneville next speaks of the variability of the dose. In some patients a dozen drops suffice, in others, even on the first inhalation, thirty are required. According as the inhalations are repeated in the same patient, it is needful to increase the dose. The nitrite of amyl, which the American physicians place at the free disposal of their patients, ought, according to M. Bourneville, to be administered only by the physician. This precaution seems to him indispensable, although, up to the present time, no accidents have been reported from its use.

The following are the titles of some recent papers on the therapeutics of the nervous system :

ONIMUS, On the Difference of the Action of Induced and Constant Currents on the Nervous System, *Practitioner* (continued article); CROTHERS, Inebriety—How Treated at the Albany Penitentiary, *Med. and Surg. Reporter*, Sept. 25; KEEN, The Anatomical, Pathological and Surgical Uses of Chloral, *Am. Jour. of Med. Sci.*, July; BULL, Bromide of Potassium in Amblyopia Potatorum, *Ibid;* PEDDIE, Remarks on the Necessity of Legislation for the Control and Treatment of Insane Drinkers, *Brit. Med. Jour.*, Aug. 28; BUDDINGTON, On the Control and Restraint of Habitual Drunkards, *Ibid;* CALLENDER, Clinical Lecture on a Case of Neuralgia Treated by Nerve Stretching, *Lancet*, Sept.; A. McL. HAMILTON, The Use of Revulsives in Diseases of the Nervous System, *Phil. Med. Times*, Sept. 4; OULMONT, The Treatment of Chorea by Hyoscyamine, *Bull. Gen. de Therap.*, Aug. 30; DUJARDIN-BEAUMETZ and AUDIGE, Experimental Researches on Alcohol, *Ibid* (continued article).

THE FOLLOWING FOREIGN PERIODICALS HAVE BEEN RECEIVED SINCE OUR LAST ISSUE.

Allgemeine Medicinische Central-Zeitung.
Allgemeine Zeitschrift fuer Psychiatrie und Psychisch. Gerichtl. Medicin.
Annales Médico-Pyschologiques.
Archiv der Heilkunde.
Archiv fuer Anatomie, Physiologie, und Wissenschaftl. Medicin.
Archiv fuer Path. Anatomie, Physiologie, und fuer Klin. Medicin.
Archiv fuer die Gesammte Physiologie der Menschen und Thiere.
Archiv fuer Psychiatrie.
Archivio Italiano, per le Malattie Nervosi.
Archivio di Medicina, Chirurgia ed Igiene.
Berliner Klinische Wochenschrift.
British Medical Journal.
Bulletin Generale de Thérapeutique.
Bulletino delle Scienze Mediche, Bologna.
Centralblatt f. d. Med. Wissenschaften.
Dublin Journal of Medicine and Surgery.
Gazetta Frenocomia di Reggio.
Gazette Médicale de Paris.
Gazette des Hopitaux.
Hygiea.
Hospitals Tidende.
Il Galvani.
Jahrbuch f. Kinderheilkunde u. Physische Erziehung.
Jahresbericht u. d. Leistungen u. Fortschritte in der Gesammt. Medicin.
Journal of Anatomy and Physiology.
Journal de l'Anatomie et de Physiologie, etc.
Journal de Medicine et de Chirurgie Pratiques.
Journal of Mental Science.
La France Médicale.
Lancet.
Le Progrès Médical.
Lo Sperimentale.
L'Union Médicale.
Medicinische Jahrbuecher.
Nordiskt Medicinskt Arkiv.
Norsk Magazin for Lagensvidenselskabens.
Pharmaceutical Journal and Transactions.
Psychiatrisches Centralblatt.
Public Health Magazine.
Rivista Clinica di Bologna.
Revista Sperimentale di Freniatria e de Medicina Legale.

Revue de Thérapeutique.
Revue des Sciences Médicales.
Revue Scientifique.
Schmidt's Jahrbuecher der In- und Auslandischen Gesammten Medicin.
St. Petersburger Med. Zeitschrift.
The Practitioner.
Upsala Lakareforenings Forehandlinger.
Vierteljahreschrift fuer die Prakt. Heilkunde.
Wiener Klinik.
Wiener Medicinische Press.
Zeitschrift f. Biologie.

The following domestic exchanges have been received:

American Journal of Insanity.
American Journal of Medical Sciences.
American Journal of Obstetrics.
American Journal of Pharmacy.
American Medical Weekly.
American Naturalist.
American Practitioner.
Atlanta Medical and Surgical Journal.
Boston Medical and Surgical Journal.
Canada Medical Record.
Chicago Medical Journal.
Clinic.
Cincinnati Lancet and Observer.
Detroit Review of Medicine and Pharmacy.
Indiana Journal of Medicine.
Medical Examiner.
Medical Herald.
Medical News and Library.
Medical Record.
Medical Register and Advertiser.
Medical and Surgical Reporter.
Nashville Journal of Medicine.
New York Medical Journal.
Peninsular Journal of Medicine.
Pacific Medical and Surgical Journal.
Pharmacist.
Philadelphia Medical Times.
Physician and Surgeon.
Physician and Pharmacist.
Psychological and Medico-Legal Journal.
Richmond and Louisville Medical Journal.
Sanitarian.
St. Louis Medical and Surgical Journal.
Virginia Medical Monthly.

BOOKS, ETC., RECEIVED.

Note.—The foreign works in this list may be obtained through Messrs. B. Westermann & Co., No. 524 Broadway, New York.

Leçons sur la Structure et les Maladies du Systeme Nerveux. Par J. Luys, Medicin de la Salpêtrière, Lannert de l'Institut, etc. Recueillees par J. Dave, interne du service. Avec une planche, et une annexe. Paris, 1875. 79 pages.

Clinical Lectures and Essays. By Sir James Paget, Bart., F.R.S., D. C. L. Oxon, etc. New York, D. Appleton & Co., 1875. 430 pages, 8vo. Chicago, Hadley Bros.

Paralysis from Brain Disease in its more Common Forms. By H. Charlton Bastian, M. D., F. R. S., etc. D. Appleton & Co., New York, 1875. 337 pages, 8vo. Chicago, Hadley Bros.

Klinische und Anatomische Beitræge zur Kenntniss der Spondylitis Deformans als einer der haufigsten Ursachen mannigfacher Neurosen, namentlich der Spinalirritation. Von Dr. Julius Braun. Mit vier Holzschnitten. Hanover, 1875. 69 pages.

Transactions of the College of Physicians of Philadelphia. Third series, vol. I. Philadelphia, 1875. Large 8vo. 192 pages.

Hysterical Symptoms in Organic Nervous Affections. By E. C. Seguin, M. D. (Reprinted from Beard's *Archives of Electrology and Neurology* May, 1875.) New York, 1875. 16 pages.

The Cholera Epidemic of 1873 in the United States. Washington, Government Printing Office, 1875. 1025 pages, 8vo.

On Periodical Melancholia. By William B. Neftel, M. D. A paper read before the New York Medical Library and Journal Association, October, 30, 1874. (Reprinted from the *Medical Record*, August 14, 1875.) 22 pages.

Muscle-Reading *vs.* Mind-Reading. By Geo. M. Beard, M. D., New York City. (Reprinted from *Review of Medicine and Pharmacy*, September, 1875.) 8 pages.

A Study of the Normal Movements of Unimpregnated Uterus. By Ely VanDerWarker, M. D., Syracuse, New York. (Reprinted from the *New York Medical Journal*, April, 1875.) D. Appleton & Co., New York. 26 pages.

Physiological Action of Gelsemia. By J. Ott, M. D., Demonstrator of Physiology, University of Pennsylvania. 17 pages.

A Statement of the Relations of the Faculty of Medicine and Surgery in the University of Michigan to Homœopathy. Detroit, 1875. 12 pages.

Transactions of the Medical and Chirurgical Faculty of Maryland. Seventy-seventh annual session held at Baltimore, April, 1875. Baltimore, 1875. 226 pages.

Tinnitus Aurium, or Noises in the Ears. Second edition, with cases. By Lawrence Trumbull, Ph.G.,M.D., etc. (Reprinted from the *Philadelphia Medical Times*, June and October, 1874.) Philadelphia, J. B. Lippincott & Co., 1875. 39 pages.

The Relations of the Nervous System to Diseases of the Skin. Part II.—Clinical. By L. Duncan Bulkley, A. M., M. D. (Reprinted from the *Archives of Electrology and Neurology*, May, 1875.) New York, G. P. Putnam's Sons, 1875. 15 pages.

A Series of American Clinical Lectures, edited by E. C. Seguin, M. D., Vol. I, No. VII. Capillary Bronchitis of Adults. By Calvin Ellis, M. D., Jackson Professor of Clinical Medicine in Harvard University. New York, G. P. Putnam's Sons, 1875. 36 pages.

Announcement and Catalogue of the National Medical College of the Columbian University, Washington, D. C., for the fifty-fourth session, 1875-6. Washington, 1875.

The Chicago Medical Register and Directory, 1875. Published under the direction and supervision of the Chicago Medico-Historical Society. Chicago, 1875. 29 pages.

University of Michigan, Ann Arbor, Michigan, Department of Medicine and Surgery. Annual Announcement, 1875-6.

Eighth Annual Announcement of Bennett Medical College, 511 and 513 State street, Chicago, Illinois, for the session, 1875-6.

On Poisons in Relation to Medical Jurisprudence and Medicine. By Alfred Swaine Taylor, M.D., F.R.S., etc. Third American, from the third and thoroughly revised English edition. With 104 illustrations. Philadelphia, H. C. Lea, 1875. 788 pages. Chicago, Jansen, McClurg & Co.

INDEX TO VOL. II.

A

Acid, Hydrocyanic 144
Aconitia 637
Action of Electricity on the Special Senses 121
Action of Emetics, The Mode of 303
" Conicine on the Cutaneous Sensibility 306
Action of Atropia and Muscarine on the Heart 306
Active Congestion 452
Administration of Ergotine in certain cases of Acute Mania, On the Hypodermic 362
Alcohol 462
Alterations in the Spinal and Sympathetic Ganglionary Systems 128
Amaurosis, Sympathetic 292
Ammonia, Physiological Effects of 459
Amyl, Nitrite of 459, 640
" " in Tetanus 460
Amyotrophic Lateral Sclerosis 137
Anæsthesia produced by Chloroform and Ether, Difference in the 145
Analgesia of the Skin After Typhoid Fever, Analysis of a Case of Circumscribed 385
Anatomy and Physiology of the Nervous System 114
Angina Pectoris, A First Attack Fatal in Twenty Hours 221
Antagonism of Remedies 140, 297
" between Chloral Hydrate and Strychnia 140
Antagonism between Sulphate of Atropia and Calabar Bean 140
Antagonism between Chloral Hydrate and Calabar Bean 141
Antagonism between Hydrochlorate and Meconate of Morphia and Calabar Bean 141
Antagonism between Meconate of Morphia and Sulphate of Atropia 141
Antagonism between Jaborandi and Atropia 463
Aphasia 18, 294, 450
Apomorphine 302
Arrest of the Heart 440
Arsenic 466
Arsenical Paralysis 624
Arteries of the Brain, The 119
Association, American Neurological 367
Asthma 126
" in Children 127
Ataxia, Locomotor 625
Atheromatous Process in its Relation to the Brain 356
Athetosis 377
Atropia, Morphia and Chloral 147
Atropia and Jaborandi, Antagonism of 463
Atropine and Muscarine, Action of, on the Heart 306
Atrophies and Hypertrophies, Treatment of 465
Atrophy of the Muscles of the Thumb, Connected with Lesion of the Cord 290
Auditory Vertigo 449
Automatism of Memory and Association in Pathological Somnambulism 48
Axis Cylinder, Constitution of the 442

B

Bladder, Sympathetic Ganglia of the 116
Blepharospasm Cured by Morphia introduced into the External Auditory Passages 309
Brachial Plexus, Injury of the 378
Brain, Researches on the Functions of the 23, 274, 439, 446, 606
Brain, Arteries of the 119
" Morbid Histology of the 123
" Disease Simulated by Overstrain of the Convergence Muscles of the Eyes 133
Brain Disease, Hemiopia in 135
" Influence of the External Use of Water on the Vessels of the 298
Brain, The Atheromatous Process in its Relation to the 356
Brain, Pigmentary Deposits in the, as the Result of Malarial Poisoning 387
Brain, Hemiplegia, with Clot on the same side of the 387
Brain, Circulation of the 443
" Electrical Currents of the 610
Bromide of Potassium 300

C

Caffeine, Valerianate of, in Obstinate Vomiting 302
Camphor, Monobromide of 469, 633
Carcinoma of the Dura Mater, involving the Gasserian Ganglion 291
Cauterization, Reflex Effects of 441
Cerebellum 115
" Hæmorrhage in the 621
Cerebral Centres, Voluntary 275, 276
" Lesions, Vascular, in the Insane 286
" Cortex, On the Existence of Definite Motor Centres in the 477
Cerebroscopy 463
Chinoline and Pyridine Bases, The Physiological Action of the 638
Chloral Hydrate 145, 464, 637
" " Atropia and Morphia 147
" " and Picrotoxine 470
Chloral, Croton 469, 304, 635
Chloroform and Ether, Difference in the Anæsthesia produced by 145
Chorea, Eserine in 461
Chronic Meningitis 132
Cicatrices of the Scalp, Neuralgia and other Neuroses arising from, and their Surgical Treatment 386
Circulation of the Brain 443
" The Retinal 277
Classification of Insanity 131
Color of the Chameleon 120, 613
Color-Blindness 287
Congestion, Active 452
Contractures 621
Constitution of the Axis Cylinder 442
Cord, Course of the Fibres in the 281
" Atrophy of the Muscles of the Thumb, connected with Lesion of the 290
Corpus Callosum, Defective 446
Cramp, Telegraphers' 455

Craniometry of the Insane and of Criminals ... 292
Croton Chloral ... 304. 469. 635
Curare ... 633
" and Strychnia ... 465
Cutaneous Eruption—Nerve Injury ... 382

D

Damiana ... 470
Deafness, Peculiar Symptom in ... 136
Decussation of the Fourth Nerve ... 613
Defective Corpus Callosum ... 446
Delirium, Management of ... 39
Diabetes, Nervous Symptoms in ... 447
Diaphragm, Paralysis of the ... 288
Differential Ophthalmoscopic Signs of Commotion and Contusion of the Brain ... 625
Digitalis ... 636
Disorders of the Optic Nerve in Cerebral Affections of Children ... 123
Distribution of the Collateral Nerves of the Fingers ... 280
Drunkenness, Pathology of. Is it a Disease, or a Moral Delinquency ? ... 503
Dura Mater, Carcinoma of the. involving the Gasserian Ganglion ... 291
Dynamometer. New ... 385

E

Eclampsia, Puerperal ... 129
Editorials on
American Medical Science ... 110
The Comparative Value of Observation and Generalization in Medical and Physiological Research ... 268
The Sympathetic Nervous System 431
American Neurological Society ... 463
The Clinical Study of Insanity ... 599
The Care of the Insane Poor ... 602
Electricity, Action of, on the Special Senses ... 121
Electricity in Hemicrania ... 467
Electrical Currents of the Brain ... 610
Electrization of the Heart ... 310
Electrization, Influence of, on the Trophic Disorders following Section of the Sciatic Nerve ... 466
Electro-therapeutics. (Review of) Beard and Rockwell's ... 416
Embolism and Hæmorrhage, Symptoms of ... 620
Emetics, Mode of Action of ... 303
Epilepsy ... 138
" Pathology of ... 1
" Nitrite of Amyl in. Experimental and Clinical Observations ... 177
Epilepsy, Muttering ... 453
Epileptic Tremor of the Lower Extremities in Certain Nervous Disorders ... 628
Equilibrium, The Sense of ... 116
Equivalent Regions of the Brains of the Primates and other Animals ... 611
Ergotine, on the Hypodermic Administration of, in Certain Cases of Acute Mania ... 362
Eserine ... 148
" in Chorea ... 461
Ether and Chloroform, Difference in the Anæsthesia Produced by ... 145
Exophthalmic Goitre ... 293
" " and its Treatment, Some Practical Observations on ... 344
Exophthalmic Goitre Associated with Chronic Urticaria, Two Cases of ... 513

F

Facial Hemiplegia ... 292
Farado-Muscular and Galvano-Muscular Contractility ... 128
Fracture of the Odontoid Process ... 386
France, Insanity in ... 447
Functions, Physiological, of the Ganglia of the Heart ... 277
Functions of the Brain, Researches on the ... 23, 274, 439, 440, 606
Functions of the Semicircular Canals ... 444
" " Lumbar Cord in the Dog 611

G

Galvano-Muscular and Farado-Muscular Contractility ... 128
Gelsemia ... 635
General Paralysis ... 287
Goitre, Exophthalmic ... 293
" " and its Treatment 344
" " Associated with Chronic Urticaria, Two Cases of ... 513
Granular Cells in the Cord in the Insane 285

H

Hæmatemesis in Hysteria ... 125
Hairs as Tactile Organs in Man ... 278
Hammer Palsy ... 136
Heart, Physiological Functions of the Ganglia of the ... 277
Heart, Action of Atropia and Muscarine on the ... 306
Heart, Electrization of the ... 310
" Arrest of the ... 440
Hemiopia in Brain Disease ... 135
Hemiplegia, Peripheral Facial ... 292
" with Clot on the same Side of the Brain ... 387
Hemicrania, Electricity in ... 467
Hæmorrhage and Embolism, Symptoms of ... 620
Hæmorrhage in the Cerebellum ... 621
Heredity, Illustrations of the Influence of both Parents on the Children ... 36
High Bodily Temperature from injury to the Spine ... 296
Hydrophobia, (Review on) ... 90
Hydrophobia ... 286
Hydrocyanic Acid ... 144
Hypertrophies and Atrophies, Treatment of ... 465
Hypodermic Administration of Ergotine in Certain Cases of Acute Mania ... 362
Hypodermic Administration of Morphia in Insanity ... 639
Hysteria. Hæmatemesis in ... 125

I

Inco-ordination of the Ocular Movements in Connection with Cerebral Lesions ... 626
Influence of Cold on the Reflex Acts ... 616
Innervation of the Uterus ... 282
Insanity, Classification of ... 131
" in France ... 447
" Transfusion of Blood in ... 467
" The Clinical Study of ... 599
" Hypodermic Injection of Morphia in ... 639
Intracranial Circulation, Effects of Drugs upon the ... 632
Intensity of the Action of Drugs According to the Weight of the Animal ... 305
Ipecacuanha ... 301
Iris, Movements and Innervation of the ... 192, 317

J

Jaborandi and Atropia, Antagonism of. 463

L

Landanin 302
Larynx, Palsy of the 295
Light, Physiological Action of 616
Lobelina 300
Locomotor Ataxia 625

M

Malarial Poisoning, Pigmentary Deposits in the Brain from 387
Management of Delirium 39
Medicine, Physiological, (Review on) .. 77
Median Occipital Fossa and the Vermis of the Cerebellum in the Insane 446
Meniere's Disease 287
Meningitis, Chronic 132
Mental Influence 458
Migraine 450
Monomania 284
Monobromide of Camphor 469, 633
Morbid Histology of the Brain 123
Morphia, Atropia and Chloral 147
Movements and Innervation of the Iris 192, 317
Muscarine and Atropia, Action of, on the Heart 306
Muscles, The Sensory Nerves of 444
Muscular Atrophy in Sciatica 618
" Lesions from Injury to the Nerves 626
Muttering Epilepsy 453
Myelitis 453
" Contributions to the Study of 372, 373

N

Nerve Cells 276
" Fibres, Structure of the 118
" Injury—Cutaneous Eruption 382
Nerves, Vaso-Dilator 278
" of the Fingers, Distribution of the Collateral 280
Nerves of the Muscles, The Sensory 444
Nervous System, Relation of the, to the Bodily Temperature 407
Nervous System, Relation of the, to the Uterus 157
Nervous System, Review of the Sympathetic 68
Nervous System, Clinical Lectures on the Diseases of the 103
Nervous System in the Respiratory Insects 613
Nervous System, Anatomy and Physiology of the 114
Nervous Symptoms in Diabetes 447
" Complications in Phthisis 448
" Disease, Syphilitic 456
Neuralgias and other Neuroses Arising from Cicatrices of the Scalp, and their Surgical Treatment 386
Neuralgias, Precocious Secondary Traumatic 124
Neuritis, On Chronic Sub-Acute 523
Neurological Association, American 367
New Dynamometer 385
Nitrite of Amyl in Epilepsy, Experimental and Clinical Observations on 177
Nitrite of Amyl 450, 640
" " in Tetanus 460
Nitrous Oxide 304

O

Odontoid Process, Fracture of the 386
On the Existence of Definite Motor Centres in the Cerebral Cortex 477
On Chronic Sub-Acute Neuritis 523
Optic Nerve, Disorders of the, in Cerebral Affections of Children 123

P

Pacinian Corpuscles, Structure of the .. 441
Palsy, Hammer 136
" of the Larynx 295
Paralysis Agitans 450
" Arsenical 624
" General 287
" Spinal, with Partial Recovery. 375
" of the Radial Nerve 126
" " Diaphragm 288
" from Sulphate of Zinc 136
Paralyzed Muscles, Treatment of, by Elastic Relaxation 378
Paraplegia by Compression 293
Pathology of Epilepsy 1
" " Drunkenness—Is it a Disease or a Moral Delinquency? 503
Peculiar Symptoms of Progressive Deafness 136
Peripheral Facial Hemiplegia 292
Pertussis 125
Phthisis, Nervous Complications in 448
Pia Mater, Reflex Innervation of the Vessels of the 117
Picrotoxine 634
and Chloral Hydrate 470
Pigmentary Deposits in the Brain, as the Result of Malarial Poisoning 387
Potassium, Bromide of 300
Precocious Secondary Traumatic Neuralgias 124
Psychological Medicine 77
Puerperal Eclampsia 129

Q

Quinine, Mechanism of the Action of, on the Circulation 636

R

Radial Nerve, Paralysis of 126
Rapidity of Sensation 612
Recent Papers, Notices ... 139, 284, 296, 310, ... 445, 456
Recurrent Sensibility 614
Reflex Innervation of the Vessels of the Pia Mater 117
Reflex Effects of Cauterization 441
" Acts, Influence of Cold on the ... 616
Relations of the Nervous System to the Uterus 157
Relation of Constitutional Diseases to Hereditary Psychoses 623
Respiration in Insects, The Nervous System in 613
Rest in Tetanus 462
Retinal Circulation, The 277
Reviews and Bibliographical Notices.
The Sympathetic Nervous System, by various Authors ... 68, 250, 389
Psychological Medicine 77
Hydrophobia 90
Davis: Clinical Lectures 97
Hammond: " " 103
Thomas: Diseases of Women 106
Tyson: Urine Analysis 107
Cohen: Croup 108

Reviews and Bibliographical Notices—cont.
Hartshorne: Practical Medicine.. 109
Erb: Diseases of the Nervous System 225
Heubner: Syphilitic Diseases of the Cerebral Vessels........ 236
Care of the Insane........ 244
Peon: Melancholia........ 256
Steiner: Children's Diseases 261
Hartley on Man........ 398
Relations of the Nervous System to Bodily Temperature in Disease 407
Beard and Rockwell: Electro-therapeutics 416
Frey: Histology and Histo-Chemistry of Man 423
The Diagnosis of Nervous Diseases 566
Fox: The Pathological Anatomy of the Nervous Centres...... 580
Bastian: Paralysis from Brain Diseases........ 587
Shorter Notices in Review 263. 424, 594

S

Sciatica, Muscular Atrophy in........ 618
Sclerosis of the Posterior columns, with Atrophy of the Right Hand and Right Half of the Tongue........ 623
Sclerosis, Lateral Amyotrophic........ 137
Sensation, Rapidity of........ 612
Sense of Equilibrium........ 116
Sensibility, Action of Conicine on the Cutaneous 306
Sensibility, Recurrent........ 614
Sensory Nerves of Muscles 444
Somnambulism, The Automatism of Memory and Association in Pathological 48
Spine, High bodily temperature from injury to the 296
Spinal Cord, The terminal ventricle of the 116
" and Sympathetic Ganglionary Systems. Alterations of the........ 128
" Paralysis, with partial recovery 375
Strychnia and Curare 465
Structure of the Nerve Fibres........ 118
" " Pacinian Corpuscles.... 441
Sympathetic Amaurosis........ 292
Sympathetic Nervous System, 68, 250, 389 431
Sympathetic Ganglia of the Bladder.... 116
Symptoms of Hæmorrhage and Embolism 620
Syphilitic Nervous Diseases........ 456

T

Telegraphers' Cramp........ 455
Terminal Ventricle of the Spinal Cord. 116
Tetany 289
Tetanus, Rest in........ 462
Thebain 467
Transfusion of Blood in Insanity...... 467
Treatment of Hypertrophies and Atrophies 465

U

Unilateral Phenomena of Mental and Nervous Disorders........ 630
Uterus, Innervation of the........ 282
" Relations of the Nervous System to the........ 157

V

Valerianate of Caffeine in Obstinate Vomiting 302
Vascular Cerebral Lesions in the Insane, 286
Vaso-Dilator Nerves........ 278
Veratroidea 143
Vertigo, Auditory........ 449

W

Water, Influence of the External use of, on the Vessels of the Brain........ 298

Z

Zinc, Paralysis from the Sulphate of... 136
Zona of the Back.. 285